

Package ‘Devore5’

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Title Data sets from Devore’s ‘‘Prob and Stat for Eng (5th ed)’’

Maintainer Douglas Bates <bates@stat.wisc.edu>

Author Original by Jay L. Devore, modifications by Douglas Bates <bates@stat.wisc.edu>

Description Data sets and sample analyses from Jay L. Devore (2000), ‘‘Probability and Statistics for Engineering and the Sciences (5th ed)’’, Duxbury.

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LazyData yes

License GPL (>= 2)

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R topics documented:

ex01.11	9
ex01.12	9
ex01.15	10
ex01.17	11
ex01.18	11
ex01.19	12
ex01.20	12
ex01.21	13
ex01.23	13
ex01.24	14
ex01.25	14
ex01.27	15
ex01.28	15

ex01.29	16
ex01.32	16
ex01.33	17
ex01.34	17
ex01.35	18
ex01.36	18
ex01.37	19
ex01.38	19
ex01.39	20
ex01.43	20
ex01.44	21
ex01.45	21
ex01.46	22
ex01.49	22
ex01.50	23
ex01.51	23
ex01.54	24
ex01.56	24
ex01.59	25
ex01.60	25
ex01.63	26
ex01.64	26
ex01.65	27
ex01.67	27
ex01.70	28
ex01.71	28
ex01.73	29
ex01.75	29
ex01.78	30
ex01.81	30
ex04.80	31
ex04.84	31
ex04.86	32
ex04.87	33
ex06.01	33
ex06.02	34
ex06.03	34
ex06.04	35
ex06.05	35
ex06.06	36
ex06.09	36
ex06.15	37
ex06.25	37
ex07.10	38
ex07.26	38
ex07.33	39
ex07.37	39
ex07.43	40

ex07.44	40
ex07.45	41
ex07.47	41
ex07.54	42
ex07.56	42
ex08.32	43
ex08.53	43
ex08.55	44
ex08.64	44
ex08.68	45
ex08.78	45
ex09.07	46
ex09.11	46
ex09.16	47
ex09.23	47
ex09.25	48
ex09.27	48
ex09.29	49
ex09.30	49
ex09.31	50
ex09.32	50
ex09.33	51
ex09.36	51
ex09.37	52
ex09.38	52
ex09.39	53
ex09.40	53
ex09.41	54
ex09.43	54
ex09.44	55
ex09.63	55
ex09.65	56
ex09.66	56
ex09.68	57
ex09.70	57
ex09.72	58
ex09.76	58
ex09.77	59
ex09.78	59
ex09.79	60
ex09.84	60
ex09.86	61
ex09.90	61
ex10.06	62
ex10.08	62
ex10.09	63
ex10.18	63
ex10.22	64

ex10.26	64
ex10.27	65
ex10.32	65
ex10.36	66
ex10.37	66
ex10.41	67
ex10.42	67
ex10.44	68
ex11.02	69
ex11.03	69
ex11.04	70
ex11.05	70
ex11.08	71
ex11.09	71
ex11.10	72
ex11.15	72
ex11.16	73
ex11.17	73
ex11.18	74
ex11.20	74
ex11.29	75
ex11.31	75
ex11.34	76
ex11.35	76
ex11.39	77
ex11.40	77
ex11.42	78
ex11.43	78
ex11.48	79
ex11.50	80
ex11.52	80
ex11.53	81
ex11.54	81
ex11.55	82
ex11.56	82
ex11.57	83
ex11.59	83
ex11.61	84
ex12.01	84
ex12.02	85
ex12.03	85
ex12.04	86
ex12.05	86
ex12.13	87
ex12.15	87
ex12.16	88
ex12.19	88
ex12.20	89

ex12.21	89
ex12.24	90
ex12.29	90
ex12.35	91
ex12.37	91
ex12.46	92
ex12.50	92
ex12.52	93
ex12.54	93
ex12.55	94
ex12.58	94
ex12.59	95
ex12.62	95
ex12.63	96
ex12.65	96
ex12.68	97
ex12.69	97
ex12.71	98
ex12.72	98
ex12.73	99
ex12.75	99
ex13.02	100
ex13.04	100
ex13.06	101
ex13.07	101
ex13.08	102
ex13.09	102
ex13.14	103
ex13.15	103
ex13.16	104
ex13.17	104
ex13.18	105
ex13.19	105
ex13.21	106
ex13.24	106
ex13.25	107
ex13.27	107
ex13.29	108
ex13.30	108
ex13.31	109
ex13.32	109
ex13.33	110
ex13.34	110
ex13.35	111
ex13.47	111
ex13.48	112
ex13.49	112
ex13.50	113

ex13.51	113
ex13.52	114
ex13.53	114
ex13.64	115
ex13.65	115
ex13.66	116
ex13.67	116
ex13.69	117
ex13.70	117
ex13.71	118
ex13.72	118
ex14.09	119
ex14.11	119
ex14.12	120
ex14.13	120
ex14.14	121
ex14.15	121
ex14.16	122
ex14.17	122
ex14.18	123
ex14.20	123
ex14.21	124
ex14.22	124
ex14.23	125
ex14.26	125
ex14.27	126
ex14.28	126
ex14.29	127
ex14.30	127
ex14.31	128
ex14.32	128
ex14.38	129
ex14.40	129
ex14.41	130
ex14.42	130
ex14.44	131
ex15.03	131
ex15.04	132
ex15.05	132
ex15.08	133
ex15.10	133
ex15.11	134
ex15.12	134
ex15.13	135
ex15.14	135
ex15.15	136
ex15.23	136
ex15.24	137

ex15.25	137
ex15.26	138
ex15.27	138
ex15.28	139
ex15.29	139
ex15.30	140
ex15.32	140
ex15.33	141
ex15.35	141
ex16.05	142
ex16.06	142
ex16.09	143
ex16.14	143
ex16.25	144
ex16.41	144
ex16.43	145
xmp01.01	145
xmp01.02	146
xmp01.06	147
xmp01.10	148
xmp01.11	149
xmp01.15	149
xmp01.16	150
xmp01.18	151
xmp01.19	151
xmp04.28	152
xmp04.29	152
xmp04.30	153
xmp06.02	154
xmp06.03	154
xmp06.12	155
xmp06.13	156
xmp07.06	156
xmp07.11	157
xmp07.15	158
xmp08.08	158
xmp09.04	159
xmp09.06	159
xmp09.08	160
xmp09.09	160
xmp09.10	161
xmp10.01	162
xmp10.03	163
xmp10.05	163
xmp10.08	164
xmp10.10	165
xmp11.01	166
xmp11.05	167

xmp11.06	168
xmp11.07	169
xmp11.11	170
xmp11.12	171
xmp11.13	172
xmp11.16	172
xmp12.01	173
xmp12.02	174
xmp12.04	175
xmp12.06	175
xmp12.08	176
xmp12.10	177
xmp12.11	177
xmp12.12	178
xmp12.14	179
xmp12.15	179
xmp13.01	180
xmp13.03	181
xmp13.04	181
xmp13.05	182
xmp13.06	183
xmp13.09	184
xmp13.11	184
xmp13.12	185
xmp13.14	186
xmp13.15	186
xmp13.17	187
xmp13.18	187
xmp13.22	188
xmp14.03	188
xmp14.10	189
xmp14.13	189
xmp14.14	190
xmp15.01	190
xmp15.02	191
xmp15.03	191
xmp15.04	192
xmp15.06	192
xmp15.08	193
xmp15.09	193
xmp15.10	194
xmp16.01	194
xmp16.04	195
xmp16.06	195
xmp16.07	196
xmp16.08	196
xmp16.09	197

ex01.11 *data from exercise 1.11*

Description

The ex01.11 data frame has 79 rows and 1 columns.

Format

This data frame contains the following columns:

octane a numeric vector

Details

Motor octane rating for various gasoline blends.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Snee, R. D. (1977) Validation of regression models: methods and examples, *Technometrics*, 415–428.

Examples

```
data(ex01.11)
attach(ex01.11)
stem(octane)                      # compact
stem(octane, scale = 2)        # expanded
summary(octane)
hist(octane)                      # standard histogram
hist(octane, prob = TRUE)
lines(density(octane), col = "blue")
rug(octane)
detach()
```

ex01.12 *data from exercise 1.12*

Description

The ex01.12 data frame has 129 rows and 1 columns.

Format

This data frame contains the following columns:

rate a numeric vector of shower-flow rates (L/min)

Details

The shower-flow rates for a sample of houses in Perth, Australia.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

James, I. R. and Knuiman, M. W. (1987) An application of Bayes methodology to the analysis of diary records in a water use study. *Journal of the American Statistical Association*, **82**, 705–711.

Examples

```
data(ex01.12)
attach(ex01.12)
boxplot(rate, main = "Boxplot of rate", ylab = "rate")
summary(rate)
stem(rate) # stem-and-leaf plot
hist(rate, xlab = "Shower-flow rate (L/min)")
hist(rate, prob = TRUE, # histogram on probability scale
      xlab = "Shower-flow rate (L/min)")
lines(density(rate, bw = 1), col = "blue")
rug(rate) # add the observations as a rug
detach()
```

ex01.15

data from exercise 1.15

Description

The ex01.15 data frame has 40 rows and 1 columns.

Format

This data frame contains the following columns:

ExamScor a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.15)
```

`ex01.17`*data from exercise 1.17*

Description

The `ex01.17` data frame has 60 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.17)
```

`ex01.18`*data from exercise 1.18*

Description

The `ex01.18` data frame has 18 rows and 2 columns.

Format

This data frame contains the following columns:

Number.of.papers a numeric vector

Frequency a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.18)
```

`ex01.19`*data from exercise 1.19*

Description

The `ex01.19` data frame has 15 rows and 2 columns.

Format

This data frame contains the following columns:

Number.of.particles a numeric vector

Frequency a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.19)
```

`ex01.20`*data from exercise 1.20*

Description

The `ex01.20` data frame has 47 rows and 1 column.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.20)
```

`ex01.21`*data from exercise 1.21*

Description

The `ex01.21` data frame has 47 rows and 2 columns.

Format

This data frame contains the following columns:

y a numeric vector

z a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.21)
```

`ex01.23`*data from exercise 1.23*

Description

The `ex01.23` data frame has 100 rows and 1 columns.

Format

This data frame contains the following columns:

cycles a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.23)
```

ex01 . 24

data from exercise 1.24

Description

The ex01 . 24 data frame has 100 rows and 1 columns.

Format

This data frame contains the following columns:

ShearStr a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01 . 24)
```

ex01 . 25

data from exercise 1.25

Description

The ex01 . 25 data frame has 40 rows and 1 columns.

Format

This data frame contains the following columns:

IDT a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01 . 25)
```

`ex01.27`*data from exercise 1.27*

Description

The `ex01.27` data frame has 50 rows and 1 columns.

Format

This data frame contains the following columns:

solids a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.27)
```

`ex01.28`*data from exercise 1.28*

Description

The `ex01.28` data frame has 48 rows and 1 columns.

Format

This data frame contains the following columns:

radiation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.28)
```

`ex01.29`*data from exercise 1.29*

Description

The `ex01.29` data frame has 60 rows and 1 columns.

Format

This data frame contains the following columns:

C5 a factor with levels B C F J M N O

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.29)
```

`ex01.32`*data from exercise 1.32*

Description

The `ex01.32` data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

Value a numeric vector

Cumulative a numeric vector of cumulative percentages

Source

Devore, J. L. (2003) *Probability and Statistics for Engineering and the Sciences (6th ed)*, Duxbury

Examples

```
data(ex01.32)
```

`ex01.33`*data from exercise 1.33*

Description

The `ex01.33` data frame has 14 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.33)
```

`ex01.34`*data from exercise 1.34*

Description

The `ex01.34` data frame has 11 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.34)
```

`ex01.35`*data from exercise 1.35*

Description

The `ex01.35` data frame has 8 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.35)
```

`ex01.36`*data from exercise 1.36*

Description

The `ex01.36` data frame has 26 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.36)
```

`ex01.37`*data from exercise 1.37*

Description

The `ex01.37` data frame has 11 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.37)
```

`ex01.38`*data from exercise 1.38*

Description

The `ex01.38` data frame has 9 rows and 1 columns.

Format

This data frame contains the following columns:

pressure a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.38)
```

ex01.39

data from exercise 1.39

Description

The ex01.39 data frame has 16 rows and 1 columns.

Format

This data frame contains the following columns:

lives a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.39)
```

ex01.43

data from exercise 1.43

Description

The ex01.43 data frame has 10 rows and 1 columns.

Format

This data frame contains the following columns:

Lifetime a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.43)
```

`ex01.44`*data from exercise 1.44*

Description

The `ex01.44` data frame has 10 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.44)
```

`ex01.45`*data from exercise 1.45*

Description

The `ex01.45` data frame has 5 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.45)
```

ex01.46

data from exercise 1.46

Description

The ex01.46 data frame has 5 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.46)
```

ex01.49

data from exercise 1.49

Description

The ex01.49 data frame has 17 rows and 1 columns.

Format

This data frame contains the following columns:

area a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.49)
```

ex01.50	<i>data from exercise 1.50</i>
---------	--------------------------------

Description

The ex01.50 data frame has 7 rows and 1 columns.

Format

This data frame contains the following columns:

LoadLife a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.50)
```

ex01.51	<i>data from exercise 1.51</i>
---------	--------------------------------

Description

The ex01.51 data frame has 19 rows and 1 columns.

Format

This data frame contains the following columns:

InducTm a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.51)
```

ex01.54

data from exercise 1.54

Description

The ex01.54 data frame has 11 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.54)
```

ex01.56

data from exercise 1.56

Description

The ex01.56 data frame has 26 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.56)
```

`ex01.59`*data from exercise 1.59*

Description

The `ex01.59` data frame has 78 rows and 2 columns.

Format

This data frame contains the following columns:

conc a numeric vector

cause a factor with levels ED non-ED

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.59)
```

`ex01.60`*data from exercise 1.60*

Description

The `ex01.60` data frame has 23 rows and 2 columns.

Format

This data frame contains the following columns:

strength a numeric vector of weld strengths

type a factor with levels Cannister or Test indicating the type of weld.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.60)
```

ex01.63

data from exercise 1.63

Description

The ex01.63 data frame has 7 rows and 3 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

C2 a numeric vector

C3 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.63)
```

ex01.64

data from exercise 1.64

Description

The ex01.64 data frame has 26 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.64)
```

`ex01.65`*data from exercise 1.65*

Description

The `ex01.65` data frame has 4 rows and 2 columns.

Format

This data frame contains the following columns:

HC a numeric vector

CO a numeric vector

Source

Devore, J. L. (2003) *Probability and Statistics for Engineering and the Sciences (6th ed)*, Duxbury

Examples

```
data(ex01.65)
```

`ex01.67`*data from exercise 1.67*

Description

The `ex01.67` data frame has 15 rows and 1 column.

Format

This data frame contains the following columns:

CO.conc a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.67)
```

`ex01.70`*data from exercise 1.70*

Description

The `ex01.70` data frame has 19 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.70)
```

`ex01.71`*data from exercise 1.71*

Description

The `ex01.71` data frame has 20 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.71)
```

`ex01.73`*data from exercise 1.73*

Description

The `ex01.73` data frame has 15 rows and 3 columns.

Format

This data frame contains the following columns:

Type.1 a numeric vector

Type.2 a numeric vector

Type.3 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.73)
```

`ex01.75`*data from exercise 1.75*

Description

The `ex01.75` data frame has 45 rows and 1 columns.

Format

This data frame contains the following columns:

Time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.75)
```

`ex01.78`*data from exercise 1.78*

Description

The `ex01.78` data frame has 15 rows and 2 columns.

Format

This data frame contains the following columns:

Length a factor with levels 10-<12 12-<14 14-<16 16-<18 18-<20 20-<22 22-<24 24-<26 26-<28 28-<30 30-<35 35-<40 40-<45 6-<8 8-<10

Frequency a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.78)
```

`ex01.81`*data from exercise 1.81*

Description

The `ex01.81` data frame has 26 rows and 1 columns.

Format

This data frame contains the following columns:

rainfall a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex01.81)
```

ex04.80 *data from exercise 4.80*

Description

The ex04.80 data frame has 10 rows and 1 columns of bearing lifetimes.

Format

This data frame contains the following columns:

lifetime a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1985), "Modified Moment Estimation for the three-parameter Log-normal distribution", *Journal of Quality Technology*, 92–99.

Examples

```
data(ex04.80)
attach(ex04.80)
boxplot(lifetime, ylab = "Lifetime (hr)",
        main = "Bearing lifetimes from exercise 4.80",
        col = "lightgray")
## Normal probability plot on the original time scale
qqnorm(lifetime, ylab = "Lifetime (hr)", las = 1)
qqline(lifetime)
## Try normal probability plot of the log(lifetime)
qqnorm(log(lifetime), ylab = "log(lifetime) (log(hr))",
        las = 1)
qqline(log(lifetime))
detach()
```

ex04.84 *data from exercise 4.84*

Description

The ex04.84 data frame has 20 rows and 1 columns of bearing load lifetimes.

Format

This data frame contains the following columns:

loadlife a numeric vector of bearing load life (million revs) for bearings tested at a 6.45 kN load.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1984) "The load-life relationship for M50 bearings with silicon nitrate ceramic balls", *Lubrication Engineering*, 153–159.

Examples

```
data(ex04.84)
attach(ex04.84)
boxplot(loadlife, ylab = "Load-Life (million revs)",
        main = "Bearing load-lives from exercise 4.84",
        col = "lightgray")
## Normal probability plot
qqnorm(loadlife, ylab = "Load-life (million revs)")
qqline(loadlife)
## Weibull probability plot
plot(
  log(-log(1 - (seq(along = loadlife) - 0.5)/length(loadlife))),
  log(sort(loadlife)), xlab = "Theoretical Quantiles",
  ylab = "log(load-life) (log(million revs))",
  main = "Weibull Q-Q Plot", las = 1)
detach()
```

ex04.86

data from exercise 4.86

Description

The ex04.86 data frame has 30 rows and 1 columns of precipitation during March in Minneapolis-St. Paul.

Format

This data frame contains the following columns:

preciptn a numeric vector of precipitation (in) during March in Minneapolis-St. Paul.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex04.86)
attach(ex04.86)
## Normal probability plot
qqnorm(preciptn, ylab = "Precipitation (in)",
      main = "Precipitation during March in Minneapolis-St. Paul")
qqline(preciptn)
```

```
## Normal probability plot on square root scale
qqnorm(sqrt(preciptn),
  ylab = expression(sqrt("Precipitation (in)")),
  main =
    "Precipitation during March in Minneapolis-St. Paul")
qqline(sqrt(preciptn))
detach()
```

ex04.87

data from exercise 4.87

Description

The ex04.87 data frame has 16 rows and 1 columns.

Format

This data frame contains the following columns:

life.hr. a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex04.87)
```

ex06.01

data from exercise 6.1

Description

The ex06.01 data frame has 27 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.01)
```

ex06.02

data from exercise 6.2

Description

The ex06.02 data frame has 20 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a factor with levels C H S T

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.02)
```

ex06.03

data from exercise 6.3

Description

The ex06.03 data frame has 16 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.03)
```

ex06.04

data from exercise 6.4

Description

The ex06.04 data frame has 20 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.04)
```

ex06.05

data from exercise 6.5

Description

The ex06.05 data frame has 5 rows and 3 columns.

Format

This data frame contains the following columns:

Book.value a numeric vector

Audited.value a numeric vector

Error a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.05)
```

ex06.06

data from exercise 6.6

Description

The ex06.06 data frame has 31 rows and 1 columns.

Format

This data frame contains the following columns:

Strmflow a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.06)
```

ex06.09

data from exercise 6.9

Description

The ex06.09 data frame has 150 rows and 1 columns.

Format

This data frame contains the following columns:

scratch a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.09)
```

`ex06.15`*data from exercise 6.15*

Description

The `ex06.15` data frame has 10 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.15)
```

`ex06.25`*data from exercise 6.25*

Description

The `ex06.25` data frame has 10 rows and 1 columns.

Format

This data frame contains the following columns:

strength a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex06.25)
```

ex07.10

data from exercise 7.10

Description

The ex07.10 data frame has 15 rows and 1 columns.

Format

This data frame contains the following columns:

lifetime a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.10)
```

ex07.26

data from exercise 7.26

Description

The ex07.26 data frame has 11 rows and 2 columns.

Format

This data frame contains the following columns:

Number.of.absences a numeric vector

Frequency a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.26)
```

`ex07.33`*data from exercise 7.33*

Description

The `ex07.33` data frame has 17 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.33)
```

`ex07.37`*data from exercise 7.37*

Description

The `ex07.37` data frame has 20 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.37)
```

ex07.43

data from exercise 7.43

Description

The ex07.43 data frame has 22 rows and 1 columns.

Format

This data frame contains the following columns:

toughnss a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.43)
```

ex07.44

data from exercise 7.44

Description

The ex07.44 data frame has 15 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.44)
```

`ex07.45`*data from exercise 7.45*

Description

The `ex07.45` data frame has 48 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.45)
```

`ex07.47`*data from exercise 7.47*

Description

The `ex07.47` data frame has 18 rows and 1 columns.

Format

This data frame contains the following columns:

ResidGas a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.47)
```

ex07.54

data from exercise 7.54

Description

The ex07.54 data frame has 16 rows and 1 columns.

Format

This data frame contains the following columns:

pul.comp a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.54)
```

ex07.56

data from exercise 7.56

Description

The ex07.56 data frame has 6 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex07.56)
```

`ex08.32`*data from exercise 8.32*

Description

The `ex08.32` data frame has 12 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex08.32)
```

`ex08.53`*data from exercise 8.53*

Description

The `ex08.53` data frame has 13 rows and 1 columns.

Format

This data frame contains the following columns:

times a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex08.53)
```

ex08.55

data from exercise 8.55

Description

The ex08.55 data frame has 6 rows and 1 columns.

Format

This data frame contains the following columns:

CO.conc a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex08.55)
```

ex08.64

data from exercise 8.64

Description

The ex08.64 data frame has 8 rows and 1 columns.

Format

This data frame contains the following columns:

SoilHeat a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex08.64)
```

`ex08.68`*data from exercise 8.68*

Description

The `ex08.68` data frame has 20 rows and 1 columns.

Format

This data frame contains the following columns:

time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex08.68)
```

`ex08.78`*data from exercise 8.78*

Description

The `ex08.78` data frame has 10 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex08.78)
```

ex09.07

data from exercise 9.7

Description

The ex09.07 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Gender a factor with levels Females Males

Sample.Size a numeric vector

Sample.Mean a numeric vector

Sample.Standard.Deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.07)
```

ex09.11

data from exercise 9.11

Description

The ex09.11 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Age a numeric vector

n a numeric vector

Mean a numeric vector

StdDev a numeric vector

Source

Devore, J. L. (2003) *Probability and Statistics for Engineering and the Sciences (6th ed)*, Duxbury

Examples

```
data(ex09.12)
```

`ex09.16`*data from exercise 9.16*

Description

The `ex09.16` data frame has 2 rows and 3 columns.

Format

This data frame contains the following columns:

Type a numeric vector

Sample.Average a numeric vector

Sample.Standard.Deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.16)
```

`ex09.23`*data from exercise 9.23*

Description

The `ex09.23` data frame has 32 rows and 2 columns.

Format

This data frame contains the following columns:

extens a numeric vector

quality a factor with levels H P

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.23)
```

ex09.25

data from exercise 9.25

Description

The ex09.25 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Condition a factor with levels LBP No LBP

Sample.size a numeric vector

Sample.mean a numeric vector

Sample.SD a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.25)
```

ex09.27

data from exercise 9.27

Description

The ex09.27 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Type.of.Player a factor with levels Advanced Intermediate

Sample.size a numeric vector

Sample.mean a numeric vector

Sample.standard.deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.27)
```

ex09.29 *data from exercise 9.29*

Description

The ex09.29 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Beverage a factor with levels Cola Strawberry drink

Sample.size a numeric vector

Sample.mean a numeric vector

Sample.standard.deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.29)
```

ex09.30 *data from exercise 9.30*

Description

The ex09.30 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Type a factor with levels Commercial carbon grid Fiberglass grid

Sample.size a numeric vector

Sample.mean a numeric vector

Sample.standard.deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.30)
```

`ex09.31`*data from exercise 9.31*

Description

The `ex09.31` data frame has 11 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.31)
```

`ex09.32`*data from exercise 9.32*

Description

The `ex09.32` data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Type.of.wood a factor with levels Douglas fir Red oak

Sample.size a numeric vector

Sample.mean a numeric vector

Sample.standard.deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.32)
```

ex09.33 *data from exercise 9.33*

Description

The ex09.33 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Treatment a factor with levels Control Steroid

Sample.size a numeric vector

Sample.mean a numeric vector

Sample.standard.deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.33)
```

ex09.36 *data from exercise 9.36*

Description

The ex09.36 data frame has 8 rows and 3 columns.

Format

This data frame contains the following columns:

Fabric a numeric vector

U a numeric vector

A a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.36)
```

ex09.37

data from exercise 9.37

Description

The ex09.37 data frame has 33 rows and 3 columns.

Format

This data frame contains the following columns:

House a numeric vector

Indoor a numeric vector

Outdoor a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.37)
```

ex09.38

data from exercise 9.38

Description

The ex09.38 data frame has 15 rows and 3 columns.

Format

This data frame contains the following columns:

Test.condition a numeric vector

Normal a numeric vector

High a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.38)
```

`ex09.39`*data from exercise 9.39*

Description

The `ex09.39` data frame has 14 rows and 4 columns.

Format

This data frame contains the following columns:

Infant a numeric vector

Isotopic.method a numeric vector

Test.weighing.method a numeric vector

Difference a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.39)
```

`ex09.40`*data from exercise 9.40*

Description

The `ex09.40` data frame has 16 rows and 2 columns.

Format

This data frame contains the following columns:

pipe a numeric vector

brush a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.40)
```

ex09.41

data from exercise 9.41

Description

The ex09.41 data frame has 9 rows and 2 columns.

Format

This data frame contains the following columns:

black a numeric vector

white a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.41)
```

ex09.43

data from exercise 9.43

Description

The ex09.43 data frame has 15 rows and 1 column.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.43)
```

`ex09.44`*data from exercise 9.44*

Description

The `ex09.44` data frame has 9 rows and 3 columns representing the results of an experiment to compare the yields (kg/ha) of Sundance winter wheat and Manitou spring wheat.

Usage

```
data(ex09.44)
```

Format

This data frame contains the following columns:

Location a numeric vector indicating the location

Sundance a numeric vector of yields (kg/ha) of Sundance winter wheat

Manitou a numeric vector of yields (kg/ha) of Manitou spring wheat

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

References

(1991) "Agronomic performance of winter versus spring wheat", *Agronomic Journal*, 527-531.

Examples

```
data(ex09.44)
str(ex09.44)
```

`ex09.63`*data from exercise 9.63*

Description

The `ex09.63` data frame has 4 rows and 2 columns.

Format

This data frame contains the following columns:

Epoxy a numeric vector

MMA a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.63)
```

ex09.65

data from exercise 9.65

Description

The ex09.65 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Method a factor with levels Fixed Floating

n a numeric vector

mean a numeric vector

SD a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.65)
```

ex09.66

data from exercise 9.66

Description

The ex09.66 data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

Fertilizer.plots a numeric vector

Control.plots a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.66)
```

ex09.68

data from exercise 9.68

Description

The ex09.68 data frame has 35 rows and 2 columns.

Format

This data frame contains the following columns:

density a numeric vector

sampling a factor with levels block pitcher

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.68)
```

ex09.70

data from exercise 9.70

Description

The ex09.70 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Type a factor with levels With.side.coating Without.side.coating

size a numeric vector

mean a numeric vector

SD a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.70)
```

ex09.72

data from exercise 9.72

Description

The ex09.72 data frame has 17 rows and 3 columns.

Format

This data frame contains the following columns:

Motor a numeric vector

Commutator a numeric vector

Pinion a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.72)
```

ex09.76

data from exercise 9.76

Description

The ex09.76 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Site a factor with levels Clean Steam.plant

size a numeric vector

mean a numeric vector

SD a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.76)
```

ex09.77	<i>data from exercise 9.77</i>
---------	--------------------------------

Description

The ex09.77 data frame has 5 rows and 3 columns.

Format

This data frame contains the following columns:

Twist a numeric vector

Control a numeric vector

Heated a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.77)
```

ex09.78	<i>data from exercise 9.78</i>
---------	--------------------------------

Description

The ex09.78 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Group a factor with levels Elderly.men Young

size a numeric vector

mean a numeric vector

stdError a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.78)
```

ex09.79	<i>data from exercise 9.79</i>
---------	--------------------------------

Description

The ex09.79 data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

Good.visibility a numeric vector

Poor.visibility a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.79)
```

ex09.84	<i>data from exercise 9.84</i>
---------	--------------------------------

Description

The ex09.84 data frame has 4 rows and 3 columns.

Format

This data frame contains the following columns:

Treatment a numeric vector

n a numeric vector

SD a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.84)
```

ex09.86	<i>data from exercise 9.86</i>
---------	--------------------------------

Description

The ex09.86 data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

Carpet a numeric vector

NoCarpet a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.86)
```

ex09.90	<i>data from exercise 9.90</i>
---------	--------------------------------

Description

The ex09.90 data frame has 8 rows and 3 columns.

Format

This data frame contains the following columns:

Number a numeric vector

Region1 a numeric vector

Region2 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex09.90)
```

ex10.06

data from exercise 10.6

Description

The ex10.06 data frame has 40 rows and 2 columns.

Format

This data frame contains the following columns:

totalFe a numeric vector

type a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.06)
```

ex10.08

data from exercise 10.8

Description

The ex10.08 data frame has 35 rows and 2 columns.

Format

This data frame contains the following columns:

stiffnss a numeric vector

length a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.08)
```

```
ex10.09          data from exercise 10.9
```

Description

The ex10.09 data frame has 6 rows and 4 columns.

Format

This data frame contains the following columns:

Wheat a numeric vector

Barley a numeric vector

Maize a numeric vector

Oats a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.09)
```

```
ex10.18          data from exercise 10.18
```

Description

The ex10.18 data frame has 20 rows and 2 columns.

Format

This data frame contains the following columns:

growth a numeric vector

hormone a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.18)
```

ex10.22

data from exercise 10.22

Description

The ex10.22 data frame has 18 rows and 3 columns.

Format

This data frame contains the following columns:

yield a numeric vector

EC a numeric vector

ECf a factor with levels A B C D

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.22)
```

ex10.26

data from exercise 10.26

Description

The ex10.26 data frame has 26 rows and 2 columns.

Format

This data frame contains the following columns:

PAPFUA a numeric vector

brand a factor with levels BlueBonnet Chiffon Fleischman Imperial Mazola Parkay

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.26)
```

ex10.27 *data from exercise 10.27*

Description

The ex10.27 data frame has 24 rows and 2 columns.

Format

This data frame contains the following columns:

Folacin a numeric vector

Brand a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.27)
```

ex10.32 *data from exercise 10.32*

Description

The ex10.32 data frame has 5 rows and 4 columns.

Format

This data frame contains the following columns:

A a numeric vector

B a numeric vector

C a numeric vector

D a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.32)
```

ex10.36

data from exercise 10.36

Description

The ex10.36 data frame has 4 rows and 5 columns.

Format

This data frame contains the following columns:

L.D a numeric vector

R a numeric vector

R.L a numeric vector

C a numeric vector

C.L a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.36)
```

ex10.37

data from exercise 10.37

Description

Motor vibration for 5 different brands of motor bearing

Usage

```
data(ex10.37)
```

Format

A data frame with 30 observations on the following 2 variables.

vibration a numeric vector

Brand a factor with levels 1 2 3 4 5

Source

Devore, J. L. (2003) *Probability and Statistics for Engineering and the Sciences (6th ed)*, Duxbury

References

“Increasing Market Share Through Improved Product and Process Design: An Experimental Approach”, *Quality Engineering*, 1991: 361-369.

Examples

```
data(ex10.37)
```

ex10.41

data from exercise 10.41

Description

The ex10.41 data frame has 12 rows and 2 columns.

Format

This data frame contains the following columns:

Percenta a numeric vector

Lab a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.41)
```

ex10.42

data from exercise 10.42

Description

The ex10.42 data frame has 19 rows and 2 columns of critical flicker frequencies according to eye color.

Usage

```
data(ex10.42)
```

Format

This data frame contains the following columns:

cff a numeric vector of critical flicker frequencies

color eye color - a factor with levels Blue, Brown, and Green

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.42)
str(ex10.42)
boxplot(cff ~ color, ex10.42, horizontal = TRUE, las = 1,
        xlab = "Critical Flicker Frequency (Hz)")
fm1 <- aov(cff ~ color, data = ex10.42)
summary(fm1)
```

ex10.44

data from exercise 10.44

Description

The ex10.44 data frame has 12 rows and 2 columns.

Format

This data frame contains the following columns:

Strength a numeric vector

Mortar a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex10.44)
```

ex11.02	<i>data from exercise 11.2</i>
---------	--------------------------------

Description

The ex11.02 data frame has 12 rows and 3 columns.

Format

This data frame contains the following columns:

corrosn a numeric vector
coating a numeric vector
SoilType a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.02)
```

ex11.03	<i>data from exercise 11.3</i>
---------	--------------------------------

Description

The ex11.03 data frame has 16 rows and 3 columns.

Format

This data frame contains the following columns:

transfer a numeric vector
gas a numeric vector
liquid a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.03)
```

ex11.04

data from exercise 11.4

Description

The ex11.04 data frame has 12 rows and 3 columns.

Format

This data frame contains the following columns:

Coverage a numeric vector

Roller a numeric vector

Paint a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.04)
```

ex11.05

data from exercise 11.5

Description

The ex11.05 data frame has 20 rows and 3 columns.

Format

This data frame contains the following columns:

force a numeric vector

angle a numeric vector

connectr a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.05)
```

ex11.08	<i>data from exercise 11.8</i>
---------	--------------------------------

Description

The ex11.08 data frame has 30 rows and 3 columns.

Format

This data frame contains the following columns:

epiniphr a numeric vector

Anesthet a numeric vector

Subject a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.08)
```

ex11.09	<i>data from exercise 11.9</i>
---------	--------------------------------

Description

The ex11.09 data frame has 36 rows and 3 columns.

Format

This data frame contains the following columns:

effort a numeric vector

Type a factor with levels T1 T2 T3 T4

Subject a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.09)
```

ex11.10

data from exercise 11.10

Description

Strength of concrete according to batch and test method

Usage

```
data(ex11.10)
```

Format

A data frame with 30 observations on the following 3 variables.

strength a numeric vector of compressive strength (MPa)

Method a factor with levels A B C

Batch a factor with levels 1 2 3 4 5 6 7 8 9 10

Source

Devore, J. L. (2003) *Probability and Statistics for Engineering and the Sciences (6th ed)*, Duxbury

Examples

```
data(ex11.10)
xtabs(strength ~ Batch + Method, data = ex11.10)
```

ex11.15

data from exercise 11.15

Description

The ex11.15 data frame has 18 rows and 4 columns.

Format

This data frame contains the following columns:

Sand a numeric vector

Carbon a numeric vector

Hardness a numeric vector

Strength a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.15)
```

ex11.16

data from exercise 11.16

Description

The ex11.16 data frame has 18 rows and 3 columns.

Format

This data frame contains the following columns:

Response a numeric vector

Formulat a numeric vector

Speed a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.16)
```

ex11.17

data from exercise 11.17

Description

The ex11.17 data frame has 18 rows and 3 columns.

Format

This data frame contains the following columns:

acidity a numeric vector

Coal a numeric vector

NaOH a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.17)
```

ex11.18

data from exercise 11.18

Description

The ex11.18 data frame has 18 rows and 3 columns.

Format

This data frame contains the following columns:

Yield a numeric vector

Speed a numeric vector

Formulation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.18)
```

ex11.20

data from exercise 11.20

Description

The ex11.20 data frame has 18 rows and 3 columns.

Format

This data frame contains the following columns:

current a numeric vector

glass a numeric vector

phosphor a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.20)
```

ex11.29

data from exercise 11.29

Description

The ex11.29 data frame has 96 rows and 4 columns.

Format

This data frame contains the following columns:

length a numeric vector

time a numeric vector

heat a numeric vector

machine a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.29)
```

ex11.31

data from exercise 11.31

Description

The ex11.31 data frame has 27 rows and 4 columns.

Format

This data frame contains the following columns:

Yield a numeric vector

time a numeric vector

tempture a numeric vector

pressure a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.31)
```

ex11.34

data from exercise 11.34

Description

The ex11.34 data frame has 36 rows and 4 columns.

Format

This data frame contains the following columns:

Sales a numeric vector

store a numeric vector

week a numeric vector

shelf a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.34)
```

ex11.35

data from exercise 11.35

Description

The ex11.35 data frame has 25 rows and 4 columns.

Format

This data frame contains the following columns:

Moisture a numeric vector

plant a numeric vector

leafsize a numeric vector

time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.35)
```

ex11.39

data from exercise 11.39

Description

The ex11.39 data frame has 24 rows and 4 columns.

Format

This data frame contains the following columns:

cleaning a numeric vector
detergnt a numeric vector
carbonat a numeric vector
cellulos a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.39)
```

ex11.40

data from exercise 11.40

Description

The ex11.40 data frame has 32 rows and 5 columns.

Format

This data frame contains the following columns:

sizing a numeric vector
conc a numeric vector
pH a numeric vector
tempture a numeric vector
time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.40)
```

ex11.42

data from exercise 11.42

Description

The ex11.42 data frame has 48 rows and 5 columns.

Format

This data frame contains the following columns:

consump a numeric vector

roof a numeric vector

power a numeric vector

scrap a numeric vector

charge a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.42)
```

ex11.43

data from exercise 11.43

Description

The ex11.43 data frame has 16 rows and 5 columns.

Format

This data frame contains the following columns:

duration a numeric vector

vibratn a numeric vector

tempture a numeric vector

altitude a numeric vector

firing a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.43)
```

ex11.48

data from exercise 11.48

Description

The ex11.48 data frame has 8 rows and 5 columns.

Format

This data frame contains the following columns:

thrust a numeric vector

vibratn a numeric vector

tempture a numeric vector

altitude a numeric vector

firing a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.48)
```

ex11.50

data from exercise 11.50

Description

The ex11.50 data frame has 45 rows and 3 columns.

Format

This data frame contains the following columns:

Smooth a numeric vector

Drying a numeric vector

Fabric a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.50)
```

ex11.52

data from exercise 11.52

Description

The ex11.52 data frame has 16 rows and 3 columns.

Format

This data frame contains the following columns:

clover a numeric vector

plot a numeric vector

rate a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.52)
```

`ex11.53`*data from exercise 11.53*

Description

The `ex11.53` data frame has 8 rows and 6 columns.

Format

This data frame contains the following columns:

Run a numeric vector

Spray.Volume a factor with levels + -

Belt.Speed a factor with levels + -

Brand a factor with levels + -

Replication.1 a numeric vector

Replication.2 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.53)
```

`ex11.54`*data from exercise 11.54*

Description

The `ex11.54` data frame has 8 rows and 5 columns.

Format

This data frame contains the following columns:

Sample.number a numeric vector

Factor.A a numeric vector

Factor.B a numeric vector

Factor.C a numeric vector

Resonse.EC50 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.54)
```

ex11.55	<i>data from exercise 11.55</i>
---------	---------------------------------

Description

The ex11.55 data frame has 16 rows and 1 columns.

Format

This data frame contains the following columns:

Extraction a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.55)
```

ex11.56	<i>data from exercise 11.56</i>
---------	---------------------------------

Description

The ex11.56 data frame has 30 rows and 3 columns.

Format

This data frame contains the following columns:

Rating a numeric vector

pH a factor with levels pH 3 pH 5.5 pH 7

Health a factor with levels Diseased Healthy

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.56)
```

ex11.57	<i>data from exercise 11.57</i>
---------	---------------------------------

Description

The ex11.57 data frame has 54 rows and 4 columns.

Format

This data frame contains the following columns:

permeability a numeric vector

Pressure a numeric vector

Temp a numeric vector

Fabric a factor with levels 420-D 630-D 840-D

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.57)
```

ex11.59	<i>data from exercise 11.59</i>
---------	---------------------------------

Description

The ex11.59 data frame has 36 rows and 4 columns.

Format

This data frame contains the following columns:

Cure.Time.1 a numeric vector

Adhesive.type a factor with levels Copper Nickel

Adhesive.factor a numeric vector

Cure.Time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.59)
```

ex11.61	<i>data from exercise 11.61</i>
---------	---------------------------------

Description

The ex11.61 data frame has 25 rows and 5 columns.

Format

This data frame contains the following columns:

weight a numeric vector
volume a numeric vector
color a numeric vector
size a numeric vector
time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex11.61)
```

ex12.01	<i>data from exercise 12.1</i>
---------	--------------------------------

Description

The ex12.01 data frame has 24 rows and 2 columns.

Format

This data frame contains the following columns:

Temp a numeric vector
Ratio a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.01)
```

ex12.02

data from exercise 12.2

Description

The ex12.02 data frame has 10 rows and 4 columns.

Format

This data frame contains the following columns:

Engine a numeric vector

Age a numeric vector

Baseline a numeric vector

Reformulated a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.02)
```

ex12.03

data from exercise 12.3

Description

The ex12.03 data frame has 20 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.03)
```

ex12.04

data from exercise 12.4

Description

The ex12.04 data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.04)
```

ex12.05

data from exercise 12.5

Description

The ex12.05 data frame has 7 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.05)
```

ex12.13	<i>data from exercise 12.13</i>
---------	---------------------------------

Description

The ex12.13 data frame has 4 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.13)
```

ex12.15	<i>data from exercise 12.15</i>
---------	---------------------------------

Description

The ex12.15 data frame has 27 rows and 2 columns.

Format

This data frame contains the following columns:

MoE a numeric vector

Strength a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.15)
```

ex12.16

data from exercise 12.16

Description

The ex12.16 data frame has 15 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.16)
```

ex12.19

data from exercise 12.19

Description

The ex12.19 data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

area a numeric vector

emission a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.19)
```

`ex12.20`*data from exercise 12.20*

Description

The `ex12.20` data frame has 13 rows and 2 columns.

Format

This data frame contains the following columns:

deposition a numeric vector

LichenN a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.20)
```

`ex12.21`*data from exercise 12.21*

Description

The `ex12.21` data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

space a numeric vector

distance a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.21)
```

ex12.24

data from exercise 12.24

Description

The ex12.24 data frame has 6 rows and 2 columns.

Format

This data frame contains the following columns:

SO.2dep. a numeric vector

Wt.loss a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.24)
```

ex12.29

data from exercise 12.29

Description

The ex12.29 data frame has 18 rows and 3 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Data.Set a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.29)
```

`ex12.35`*data from exercise 12.35*

Description

The `ex12.35` data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.35)
```

`ex12.37`*data from exercise 12.37*

Description

The `ex12.37` data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

pressure a numeric vector

time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.37)
```

ex12.46

data from exercise 12.46

Description

The ex12.46 data frame has 13 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.46)
```

ex12.50

data from exercise 12.50

Description

The ex12.50 data frame has 11 rows and 2 columns.

Format

This data frame contains the following columns:

field a numeric vector

time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.50)
```

ex12.52

data from exercise 12.52

Description

The ex12.52 data frame has 9 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.52)
```

ex12.54

data from exercise 12.54

Description

The ex12.54 data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

distance a numeric vector

yield a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.54)
```

ex12.55

data from exercise 12.55

Description

The ex12.55 data frame has 12 rows and 2 columns.

Format

This data frame contains the following columns:

age a numeric vector

damaged a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.55)
```

ex12.58

data from exercise 12.58

Description

The ex12.58 data frame has 12 rows and 2 columns.

Format

This data frame contains the following columns:

TOST a numeric vector

RBOT a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.58)
```

`ex12.59`*data from exercise 12.59*

Description

The `ex12.59` data frame has 18 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.59)
```

`ex12.62`*data from exercise 12.62*

Description

The `ex12.62` data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.62)
```

ex12.63

data from exercise 12.63

Description

The ex12.63 data frame has 6 rows and 2 columns.

Format

This data frame contains the following columns:

stiffnss a numeric vector

thicknss a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.63)
```

ex12.65

data from exercise 12.65

Description

The ex12.65 data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

blood a numeric vector

gasoline a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.65)
```

`ex12.68`*data from exercise 12.68*

Description

The `ex12.68` data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

RDF a numeric vector

eff a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.68)
```

`ex12.69`*data from exercise 12.69*

Description

The `ex12.69` data frame has 13 rows and 2 columns.

Format

This data frame contains the following columns:

drain.wt a numeric vector

Cl.trace a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.69)
```

ex12.71

data from exercise 12.71

Description

The ex12.71 data frame has 13 rows and 2 columns.

Format

This data frame contains the following columns:

austenite a numeric vector

wearLoss a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.71)
```

ex12.72

data from exercise 12.72

Description

The ex12.72 data frame has 9 rows and 2 columns.

Format

This data frame contains the following columns:

CO a numeric vector

Noy a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.72)
```

`ex12.73`*data from exercise 12.73*

Description

The `ex12.73` data frame has 9 rows and 2 columns.

Format

This data frame contains the following columns:

age a numeric vector

load a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.73)
```

`ex12.75`*data from exercise 12.75*

Description

The `ex12.75` data frame has 9 rows and 2 columns.

Format

This data frame contains the following columns:

absorb a numeric vector

peakVolt a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex12.75)
```

ex13.02

data from exercise 13.2

Description

The ex13.02 data frame has 9 rows and 2 columns.

Format

This data frame contains the following columns:

rate a numeric vector

stdResid a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.02)
```

ex13.04

data from exercise 13.4

Description

The ex13.04 data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

thicknss a numeric vector

current a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.04)
```

`ex13.06`*data from exercise 13.6*

Description

The `ex13.06` data frame has 6 rows and 2 columns.

Format

This data frame contains the following columns:

density a numeric vector

moisture a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.06)
```

`ex13.07`*data from exercise 13.7*

Description

The `ex13.07` data frame has 5 rows and 2 columns.

Format

This data frame contains the following columns:

exposure a numeric vector

weight a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.07)
```

ex13.08

data from exercise 13.8

Description

The ex13.08 data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

age a numeric vector

growth a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.08)
```

ex13.09

data from exercise 13.9

Description

The ex13.09 data frame has 44 rows and 3 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

set a factor with levels a b c d

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.09)
```

ex13.14

data from exercise 13.14

Description

The ex13.14 data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

weight a numeric vector

clearnce a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.14)
```

ex13.15

data from exercise 13.15

Description

The ex13.15 data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.15)
```

ex13.16

data from exercise 13.16

Description

The ex13.16 data frame has 12 rows and 2 columns.

Format

This data frame contains the following columns:

Spectral a numeric vector

ln.L178. a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.16)
```

ex13.17

data from exercise 13.17

Description

The ex13.17 data frame has 13 rows and 2 columns.

Format

This data frame contains the following columns:

MassRate a numeric vector

FlameLen a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.17)
```

ex13.18

data from exercise 13.18

Description

The ex13.18 data frame has 4 rows and 2 columns.

Format

This data frame contains the following columns:

Conc. a numeric vector

pH a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.18)
```

ex13.19

data from exercise 13.19

Description

The ex13.19 data frame has 18 rows and 2 columns.

Format

This data frame contains the following columns:

Temp a numeric vector

Lifetime a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.19)
```

ex13.21

data from exercise 13.21

Description

The ex13.21 data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

thicknss a numeric vector

conduct a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.21)
```

ex13.24

data from exercise 13.24

Description

The ex13.24 data frame has 40 rows and 2 columns.

Format

This data frame contains the following columns:

age a numeric vector

Kyphosis a factor with levels N Y

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.24)
```

`ex13.25`*data from exercise 13.25*

Description

The `ex13.25` data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

Success a numeric vector

Failure a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.25)
```

`ex13.27`*data from exercise 13.27*

Description

The `ex13.27` data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

time a numeric vector

conc a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.27)
```

`ex13.29`*data from exercise 13.29*

Description

The `ex13.29` data frame has 5 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.29)
```

`ex13.30`*data from exercise 13.30*

Description

The `ex13.30` data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

water a numeric vector

yield a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.30)
```

`ex13.31`*data from exercise 13.31*

Description

The `ex13.31` data frame has 7 rows and 2 columns.

Format

This data frame contains the following columns:

velocity a numeric vector

conversn a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.31)
```

`ex13.32`*data from exercise 13.32*

Description

The `ex13.32` data frame has 16 rows and 2 columns.

Format

This data frame contains the following columns:

soil.Ph a numeric vector

conc a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.32)
```

`ex13.33`*data from exercise 13.33*

Description

The `ex13.33` data frame has 7 rows and 2 columns.

Format

This data frame contains the following columns:

angle a numeric vector

efficiency a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.33)
```

`ex13.34`*data from exercise 13.34*

Description

The `ex13.34` data frame has 13 rows and 2 columns.

Format

This data frame contains the following columns:

cations a numeric vector

exchange a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.34)
```

ex13.35 *data from exercise 13.35*

Description

The ex13.35 data frame has 5 rows and 2 columns.

Format

This data frame contains the following columns:

tempture a numeric vector

rate a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.35)
```

ex13.47 *data from exercise 13.47*

Description

The ex13.47 data frame has 30 rows and 6 columns.

Format

This data frame contains the following columns:

Row a numeric vector

Plastics a numeric vector

Paper a numeric vector

Garbage a numeric vector

Water a numeric vector

Energy.content a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.47)
```

ex13.48

data from exercise 13.48

Description

The ex13.48 data frame has 15 rows and 4 columns.

Format

This data frame contains the following columns:

x1 a numeric vector

x2 a numeric vector

x3 a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.48)
```

ex13.49

data from exercise 13.49

Description

The ex13.49 data frame has 12 rows and 3 columns.

Format

This data frame contains the following columns:

yield a numeric vector

temp a numeric vector

sunshine a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.49)
```

ex13.50	<i>data from exercise 13.50</i>
---------	---------------------------------

Description

The ex13.50 data frame has 14 rows and 3 columns.

Format

This data frame contains the following columns:

Col1 a numeric vector

Col2 a numeric vector

Col3 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.50)
```

ex13.51	<i>data from exercise 13.51</i>
---------	---------------------------------

Description

The ex13.51 data frame has 14 rows and 3 columns.

Format

This data frame contains the following columns:

shear a numeric vector

depth a numeric vector

water a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.51)
```

ex13.52

data from exercise 13.52

Description

The ex13.52 data frame has 31 rows and 5 columns.

Format

This data frame contains the following columns:

Bright a numeric vector

H2O2 a numeric vector

NaOH a numeric vector

Silicate a numeric vector

Tempture a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.52)
```

ex13.53

data from exercise 13.53

Description

The ex13.53 data frame has 10 rows and 3 columns.

Format

This data frame contains the following columns:

q a numeric vector

a a numeric vector

b a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.53)
```

`ex13.64`*data from exercise 13.64*

Description

The `ex13.64` data frame has 16 rows and 2 columns.

Format

This data frame contains the following columns:

Log.edges. a numeric vector

Log.time. a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.64)
```

`ex13.65`*data from exercise 13.65*

Description

The `ex13.65` data frame has 18 rows and 2 columns.

Format

This data frame contains the following columns:

Pressure a numeric vector

Temperature a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.65)
```

ex13.66

data from exercise 13.66

Description

The ex13.66 data frame has 9 rows and 3 columns.

Format

This data frame contains the following columns:

x1.in. a numeric vector

x2.in. a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.66)
```

ex13.67

data from exercise 13.67

Description

The ex13.67 data frame has 32 rows and 7 columns.

Format

This data frame contains the following columns:

Obs a numeric vector

pdconc a numeric vector

niconc a numeric vector

pH a numeric vector

temp a numeric vector

currdens a numeric vector

pallcont a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.67)
```

ex13.69

data from exercise 13.69

Description

The ex13.69 data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

power a numeric vector

freq a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.69)
```

ex13.70

data from exercise 13.70

Description

The ex13.70 data frame has 12 rows and 2 columns.

Format

This data frame contains the following columns:

log.con. a numeric vector

Li2O a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.70)
```

`ex13.71`*data from exercise 13.71*

Description

The `ex13.71` data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

height a numeric vector

log.Mn. a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.71)
```

`ex13.72`*data from exercise 13.72*

Description

The `ex13.72` data frame has 9 rows and 3 columns.

Format

This data frame contains the following columns:

x1 a numeric vector

x2 a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex13.72)
```

ex14.09

data from exercise 14.9

Description

The ex14.09 data frame has 40 rows and 1 columns.

Format

This data frame contains the following columns:

time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.09)
```

ex14.11

data from exercise 14.11

Description

The ex14.11 data frame has 45 rows and 1 columns.

Format

This data frame contains the following columns:

diam a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.11)
```

ex14.12

data from exercise 14.12

Description

The ex14.12 data frame has 4 rows and 2 columns.

Format

This data frame contains the following columns:

male.children a numeric vector

Frequency a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.12)
```

ex14.13

data from exercise 14.13

Description

The ex14.13 data frame has 3 rows and 2 columns.

Format

This data frame contains the following columns:

ovaries.developed a numeric vector

Observed.count a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.13)
```

`ex14.14`*data from exercise 14.14*

Description

The `ex14.14` data frame has 12 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

observed a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.14)
```

`ex14.15`*data from exercise 14.15*

Description

The `ex14.15` data frame has 5 rows and 2 columns.

Format

This data frame contains the following columns:

Number.defective a numeric vector

Frequency a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.15)
```

`ex14.16`*data from exercise 14.16*

Description

The `ex14.16` data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

Number.exchanges a numeric vector

Observed.counts a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.16)
```

`ex14.17`*data from exercise 14.17*

Description

The `ex14.17` data frame has 13 rows and 2 columns.

Format

This data frame contains the following columns:

borers a numeric vector

freq a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.17)
```

`ex14.18`*data from exercise 14.18*

Description

The `ex14.18` data frame has 5 rows and 2 columns.

Format

This data frame contains the following columns:

Rate..per.day. a factor with levels `.100-below .150 .150-below .200 .200-below .250 .250 or more Below .100`

Frequency a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.18)
```

`ex14.20`*data from exercise 14.20*

Description

The `ex14.20` data frame has 23 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.20)
```

ex14.21

data from exercise 14.21

Description

The ex14.21 data frame has 24 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.21)
```

ex14.22

data from exercise 14.22

Description

The ex14.22 data frame has 25 rows and 1 columns.

Format

This data frame contains the following columns:

toughnss a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.22)
```

ex14.23

data from exercise 14.23

Description

The ex14.23 data frame has 30 rows and 1 columns.

Format

This data frame contains the following columns:

Strength a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.23)
```

ex14.26

data from exercise 14.26

Description

The ex14.26 data frame has 5 rows and 3 columns.

Format

This data frame contains the following columns:

Treatment a factor with levels Control Eight leaves removed Four leaves removed Six leaves removed Two leaves removed

Matured a numeric vector

Aborted a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.26)
```

ex14.27

data from exercise 14.27

Description

The ex14.27 data frame has 2 rows and 5 columns.

Format

This data frame contains the following columns:

C1 a factor with levels Men Women

L.R a numeric vector

L.R.1 a numeric vector

L.R.2 a numeric vector

Sample.size a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.27)
```

ex14.28

data from exercise 14.28

Description

The ex14.28 data frame has 4 rows and 4 columns.

Format

This data frame contains the following columns:

Thienyla a numeric vector

Solvent a numeric vector

Sham a numeric vector

Unhandle a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.28)
```

ex14.29

data from exercise 14.29

Description

The ex14.29 data frame has 6 rows and 3 columns.

Format

This data frame contains the following columns:

M.M a numeric vector

M.F a numeric vector

F.F a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.29)
```

ex14.30

data from exercise 14.30

Description

The ex14.30 data frame has 12 rows and 3 columns.

Format

This data frame contains the following columns:

count a numeric vector

Config a numeric vector

Mode a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.30)
```

ex14.31

data from exercise 14.31

Description

The ex14.31 data frame has 12 rows and 3 columns.

Format

This data frame contains the following columns:

count a numeric vector

Size a factor with levels Compact Fullsize Midsize Subcompact

dist a factor with levels 0-<10 10-<20 >=20

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.31)
```

ex14.32

data from exercise 14.32

Description

The ex14.32 data frame has 3 rows and 3 columns.

Format

This data frame contains the following columns:

Liberal a numeric vector

Consvrtv a numeric vector

Other a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.32)
```

ex14.38 *data from exercise 14.38*

Description

The ex14.38 data frame has 3 rows and 2 columns.

Format

This data frame contains the following columns:

Parsitiz a numeric vector

Nonparas a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.38)
```

ex14.40 *data from exercise 14.40*

Description

The ex14.40 data frame has 4 rows and 3 columns.

Format

This data frame contains the following columns:

Sport a factor with levels Baseball Basketball Football Hockey

Leader.Wins a numeric vector

Leader.Loses a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.40)
```

ex14.41

data from exercise 14.41

Description

The ex14.41 data frame has 3 rows and 3 columns.

Format

This data frame contains the following columns:

Never a numeric vector

Occasion a numeric vector

Regular a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.41)
```

ex14.42

data from exercise 14.42

Description

The ex14.42 data frame has 4 rows and 3 columns.

Format

This data frame contains the following columns:

Home a numeric vector

Acute a numeric vector

Chronic a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.42)
```

`ex14.44`*data from exercise 14.44*

Description

The `ex14.44` data frame has 5 rows and 2 columns.

Format

This data frame contains the following columns:

sample a numeric vector

item.prc a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex14.44)
```

`ex15.03`*data from exercise 15.3*

Description

The `ex15.03` data frame has 14 rows and 1 column.

Format

This data frame contains the following columns:

pH a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.03)
```

ex15.04

data from exercise 15.4

Description

The ex15.04 data frame has 15 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.04)
```

ex15.05

data from exercise 15.5

Description

The ex15.05 data frame has 12 rows and 3 columns.

Format

This data frame contains the following columns:

Sample a numeric vector

Gravimetric a numeric vector

Spectrophotometric a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.05)
```

ex15.08

data from exercise 15.8

Description

The ex15.08 data frame has 25 rows and 1 columns.

Format

This data frame contains the following columns:

toughnss a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.08)
```

ex15.10

data from exercise 15.10

Description

The ex15.10 data frame has 5 rows and 2 columns.

Format

This data frame contains the following columns:

adhesv.1 a numeric vector

adhesv.2 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.10)
```

ex15.11

data from exercise 15.11

Description

The ex15.11 data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

Time a numeric vector

wood a factor with levels Oak Pine

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.11)
```

ex15.12

data from exercise 15.12

Description

The ex15.12 data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

Original a numeric vector

Modified a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.12)
```

ex15.13

data from exercise 15.13

Description

The ex15.13 data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

Orange.J a numeric vector

Ascorbic a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.13)
```

ex15.14

data from exercise 15.14

Description

The ex15.14 data frame has 10 rows and 2 columns.

Format

This data frame contains the following columns:

Orange.J a numeric vector

Ascorbic a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.14)
```

ex15.15

data from exercise 15.15

Description

The ex15.15 data frame has 15 rows and 2 columns.

Format

This data frame contains the following columns:

conc a numeric vector

exposed a factor with levels N Y

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.15)
```

ex15.23

data from exercise 15.23

Description

The ex15.23 data frame has 5 rows and 4 columns.

Format

This data frame contains the following columns:

Region.1 a numeric vector

Region.2 a numeric vector

Region.3 a numeric vector

Region.4 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.23)
```

ex15.24

data from exercise 15.24

Description

The ex15.24 data frame has 9 rows and 4 columns.

Format

This data frame contains the following columns:

X1 a numeric vector

X2 a numeric vector

X3 a numeric vector

X4 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.24)
```

ex15.25

data from exercise 15.25

Description

The ex15.25 data frame has 22 rows and 2 columns.

Format

This data frame contains the following columns:

cortisol a numeric vector

Group a factor with levels A B C

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.25)
```

ex15.26

data from exercise 15.26

Description

The ex15.26 data frame has 10 rows and 5 columns.

Format

This data frame contains the following columns:

Blocks a numeric vector

A a numeric vector

B a numeric vector

C a numeric vector

D a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.26)
```

ex15.27

data from exercise 15.27

Description

The ex15.27 data frame has 10 rows and 4 columns.

Format

This data frame contains the following columns:

Dog a numeric vector

Isoflurane a numeric vector

Halothane a numeric vector

Cyclopropane a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.27)
```

ex15.28 *data from exercise 15.28*

Description

The ex15.28 data frame has 8 rows and 3 columns.

Format

This data frame contains the following columns:

Subject a numeric vector

Potato a numeric vector

Rice a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.28)
```

ex15.29 *data from exercise 15.29*

Description

The ex15.29 data frame has 9 rows and 4 columns.

Format

This data frame contains the following columns:

X1973 a numeric vector

X1974 a numeric vector

X1975 a numeric vector

X1976 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.29)
```

ex15.30

data from exercise 15.30

Description

The ex15.30 data frame has 5 rows and 4 columns.

Format

This data frame contains the following columns:

Treatment.I a numeric vector

Treatment.II a numeric vector

Treatment.III a numeric vector

Treatment.IV a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.30)
```

ex15.32

data from exercise 15.32

Description

The ex15.32 data frame has 13 rows and 2 columns.

Format

This data frame contains the following columns:

Time a numeric vector

Gait a factor with levels Diagonal Lateral

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.32)
```

ex15.33

data from exercise 15.33

Description

The ex15.33 data frame has 20 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.33)
```

ex15.35

data from exercise 15.35

Description

The ex15.35 data frame has 9 rows and 2 columns.

Format

This data frame contains the following columns:

thickness a numeric vector

condition a factor with levels Control SIDS

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex15.35)
```

ex16.05

data from exercise 16.5

Description

The ex16.05 data frame has 22 rows and 5 columns.

Format

This data frame contains the following columns:

moist1 a numeric vector

moist2 a numeric vector

moist3 a numeric vector

moist4 a numeric vector

moist5 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex16.05)
```

ex16.06

data from exercise 16.6

Description

The ex16.06 data frame has 22 rows and 5 columns.

Format

This data frame contains the following columns:

Col1 a numeric vector

Col2 a numeric vector

Col3 a numeric vector

Col4 a numeric vector

Col5 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex16.06)
```

ex16.09

data from exercise 16.9

Description

The ex16.09 data frame has 24 rows and 2 columns.

Format

This data frame contains the following columns:

xbar a numeric vector

stderr a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex16.09)
```

ex16.14

data from exercise 16.14

Description

The ex16.14 data frame has 24 rows and 1 column.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex16.14)
```

ex16.25

data from exercise 16.25

Description

The ex16.25 data frame has 21 rows and 3 columns.

Format

This data frame contains the following columns:

C1 a factor with levels 1 10 11 12 13 14 15 16 17 18 19 2 20 3 4 5 6 7 8 9 Panel

C2 a factor with levels 0.6 0.8 1 Area Examined

C3 a factor with levels # Blemishes 1 10 12 2 3 4 5 6

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex16.25)
```

ex16.41

data from exercise 16.41

Description

The ex16.41 data frame has 22 rows and 3 columns.

Format

This data frame contains the following columns:

tensile1 a numeric vector

tensile2 a numeric vector

tensile3 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex16.41)
```

`ex16.43`*data from exercise 16.43*

Description

The `ex16.43` data frame has 20 rows and 3 columns.

Format

This data frame contains the following columns:

n a numeric vector

xbar a numeric vector

stderr a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(ex16.43)
```

`xmp01.01`*data from Example 1.1*

Description

The `xmp01.01` data frame has 36 rows and 1 column of O-ring temperatures for space shuttle test firings or launches.

Format

This data frame contains the following columns:

temp a numeric vector of temperatures (degrees F)

Details

The O-ring temperatures for each test firing of the engines or actual launch of the space shuttle prior to the 1986 explosion of the *Challenger*.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
Presidential Commission on the Space Shuttle Challenger Accident, Vol. 1, 1986: 129–131

Examples

```

data(xmp01.01)
attach(xmp01.01)
summary(temp)          # summary statistics
stem(temp)
hist(temp, xlab = "Temperature (deg. F)")
rug(temp)
hist(temp, xlab = "Temperature (deg. F)",
      prob = TRUE, col = "lightgray")
lines(density(temp), col = "blue")
rug(temp)
detach()

```

xmp01.02

data from Example 1.2

Description

The xmp01.02 data frame has 27 rows and 1 column of flexural strengths of concrete.

Format

This data frame contains the following columns:

strength a numeric vector of flexural strengths (MegaPascals)

Details

Data on the flexural strength (MPa) of high-performance concrete beams obtained by using super-plasticizers and certain binders.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
 (1997) "Effects of aggregates and microfillers on the flexural properties of concrete", *Magazine of Concrete Research*, 81–98.

Examples

```

data(xmp01.02)
attach(xmp01.02)
hist(strength, xlab = "Flexural strength (MPa)",
      col = "lightgray")
rug(strength)
summary(strength)
boxplot(strength, col = "lightgray", notch = TRUE,
        ylab = "Flexural strength (MPa)",
        main = "Boxplot of strength",
        sub =

```

```
"Notches show a 95% confidence interval on the median strength")  
detach()
```

xmp01.06

data from Example 1.6

Description

The xmp01.06 data frame has 40 rows and 1 columns.

Format

This data frame contains the following columns:

yardage a numeric vector

Details

Described in Devore (1995) as “ A random sample of the yardages of golf courses that have been designated by *Golf Digest* as among the most challenging in the United States.”

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp01.06)  
attach(xmp01.06)  
summary(yardage)  
stem(yardage)  
hist(yardage, col = "lightgray",  
      xlab = "Golf course yardages")  
rug(yardage)  
qqnorm(yardage, las = 1, ylab = "Golf course yardages")  
detach()
```

xmp01.10

data from Example 1.10

Description

The xmp01.10 data frame has 90 rows and 1 column of adjusted power consumption for a sample of gas-heated homes.

Format

This data frame contains the following columns:

consump a numeric vector of adjusted power consumption (BTU) for gas-heated homes.

Details

Data obtained by Wisconsin Power and Light on the adjusted energy consumption during a particular period for a sample of gas-heated homes. The energy consumption in BTU's is adjusted for the size (area) of the house and the weather (number of degree days of heating).

These data are part of the FURNACE.MTW worksheet available with Minitab.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp01.10)
attach(xmp01.10)
hist(consump, col = "lightgray",
      xlab = "Adjusted energy consumption")
rug(consump)
hist(consump, col = "lightgray",
      xlab = "Adjusted energy consumption",
      prob = TRUE)
lines(density(consump), col = "blue")
rug(consump)
summary(consump)
# Make a histogram like Fig 1.9, p. 19
hist(consump, breaks = 1 + 2*(0:9),
      xlab = "BTUN", prob = TRUE, col = "lightgray")
rug(consump)
detach()
```

`xmp01.11`*data from Example 1.11*

Description

The `xmp01.11` data frame has 48 rows and 1 column of measured bond strengths of glass-fiber-reinforced rebars and concrete.

Format

This data frame contains the following columns:

strength a numeric vector of bond strengths

Details

Data from a study to develop guidelines for bonding glass-fiber-reinforced rebars to concrete.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1996) "Design recommendations for bond of GFRP rebars to concrete", *Journal of Structural Engineering*, 247-254.

Examples

```
data(xmp01.11)
attach(xmp01.11)
hist(strength, xlab = "Bond strength", col = "lightgray")
rug(strength)
hist(log(strength), xlab = "log(bond strength)", col = "lightgray")
rug(log(strength))
## Create a histogram like Fig 1.11, page 20
hist(strength, breaks = c(2,4,6,8,12,20,30), prob = TRUE,
      col = "lightgray", xlab = "Bond strength")
rug(strength)
detach()
```

`xmp01.15`*data from Example 1.15*

Description

The `xmp01.15` data frame has 20 rows and 1 columns.

Format

This data frame contains the following columns:

lifetime a numeric vector of lifetimes (hr) of a certain type of incandescent light bulb.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp01.15)
attach(xmp01.15)
summary(lifetime)           # produces mean, median, etc.
mean(lifetime, trim = 0.1)  # 10% trimmed mean
mean(lifetime, trim = 0.2)  # 20% trimmed mean
dotchart(lifetime)
hist(lifetime)              # display a histogram
rug(lifetime)               # add the data
abline(v = median(lifetime), col = 2, lty = 2)
abline(v = mean(lifetime), col = 3, lty = 2)
abline(v = mean(lifetime, trim = 0.1), col = 4, lty = 2)
abline(v = mean(lifetime, trim = 0.2), col = 5, lty = 2)
legend(600, 6,
      c("median", "mean", "10% trimmed mean", "20% trimmed mean"),
      col = 2:5, lty = 2)
```

xmp01.16

data from Example 1.16

Description

The xmp01.16 data frame has 11 rows and 1 columns.

Format

This data frame contains the following columns:

Strength a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp01.16)
```

`xmp01.18`*data from Example 1.18*

Description

The `xmp01.18` data frame has 19 rows and 1 columns.

Format

This data frame contains the following columns:

depth a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp01.18)
```

`xmp01.19`*data from Example 1.19*

Description

The `xmp01.19` data frame has 25 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp01.19)
```

xmp04.28 *data from Example 4.28*

Description

The xmp04.28 data frame has 10 rows and 1 columns of constructed data representing measurement errors.

Format

This data frame contains the following columns:

meas.err a numeric vector of measurement errors (no units given)

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp04.28)
attach(xmp04.28)
qqnorm(meas.err) # compare to Figure 4.31, p. 188
qqline(meas.err)
detach()
```

xmp04.29 *data from Example 4.29*

Description

The xmp04.29 data frame has 19 rows and 2 columns of dielectric breakdown voltages and their corresponding standard normal quantiles used in a normal probability plot.

Format

This data frame contains the following columns:

Voltage a sorted numeric vector of the dielectric breakdown voltages measured on a piece of epoxy resin.

z.percentile a numeric vector of standard normal quantiles

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
(1996) "Maximum likelihood estimation in the 3-parameter Weibull Distribution", *IEEE Transactions on Dielectrics and Electrical Insulation*, 43–55.

Examples

```

data(xmp04.29)
attach(xmp04.29)
## compare to Figure 4.33, page 190
qqp <- qqnorm(Voltage)
qqline(Voltage)
detach()
## compare quantiles with those given in book
cbind(qqp, xmp04.29)

```

xmp04.30

data from Example 4.30

Description

The xmp04.30 data frame has 10 rows and 1 column of lifetimes of power apparatus insulation.

Format

This data frame contains the following columns:

lifetime a numeric vector of lifetimes (hr) of power apparatus insulation under thermal and electrical stress.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1985) "On the estimation of life of power apparatus under combined electrical and thermal stress", *IEEE Transactions on Electrical Insulation*, 70–78.

Examples

```

data(xmp04.30)
attach(xmp04.30)
## Try normal probability plot first
qqnorm(lifetime, ylab = "Lifetime (hr)")
qqline(lifetime)
## Weibull probability plot, compare Figure 4.36, p. 194
plot(log(-log(1 - seq(0.05, 0.95, 0.1))),
     log(sort(lifetime)), xlab = "Theoretical Quantiles",
     ylab = "log(Lifetime) (log(hr))",
     main = "Weibull Q-Q Plot", las = 1)
detach()

```

xmp06.02 *data from Example 6.2*

Description

The xmp06.02 data frame has 20 rows and 1 columns.

Format

This data frame contains the following columns:

Voltage the dielectric breakdown voltage for pieces of epoxy resin

Details

This is the same data set as xmp04.29.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp06.02)
summary(xmp06.02)           # gives mean, median, etc.
attach(xmp06.02)
mean(range(Voltage))       # average of the extremes
mean(Voltage, trim = 0.1)  # trimmed mean
```

xmp06.03 *data from Example 6.3*

Description

The xmp06.03 data frame has 8 rows and 1 columns.

Format

This data frame contains the following columns:

Strength elastic modulus (GPa) of AZ91D alloy specimens from a die-casting process

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
 (1998), On the development of a new approach for the determination of yield strength in Mg-based alloys, *Light Metal Age*, Oct., 50-53.

Examples

```

data(xmp06.03)
attach(xmp06.03)
stem(Strength)
var(Strength) # usual (unbiased) estimate of sigma^2
## alternative estimate of sigma^2 with n in denominator
sum((Strength - mean(Strength))^2)/length(Strength)

```

xmp06.12

*data from Example 6.12***Description**

The xmp06.12 data frame has 20 rows and 1 columns of data on the survival times of mice subjected to radiation.

Format

This data frame contains the following columns:

Survival a numeric vector of survival times (weeks) of mice subjected to 240 rads of gamma radiation.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury.
 Gross, A. J. and Clark, V. (1976) *Survival Distributions: Reliability Applications in the Biomedical Sciences*, Wiley.

Examples

```

data(xmp06.12)
attach(xmp06.12)
gamma.MoM <- function(x) {
  ## calculate method of moments estimates for gamma distribution
  xbar <- mean(x)
  mnSqDev <- mean((x - xbar)^2)
  c(alpha = xbar^2/mnSqDev, beta = mnSqDev/xbar)
}
## method of moments estimates
print(surv.MoM <- gamma.MoM(Survival))
## evaluating the negative log-likelihood
gammaLlik <- function(x) {
  ## argument x is a vector of shape (alpha) and scale (beta)
  -sum(dgamma(Survival, shape = x[1], scale = x[2], log = TRUE))
}
## maximum likelihood estimates - use MoM estimates as starting value
MLE <- optim(par = surv.MoM, gammaLlik)
print(MLE)
detach()

```

xmp06.13

data from Example 6.13

Description

The xmp06.13 data frame has 420 rows and 1 column of the number of goals pre game scored by National Hockey League teams during the 1966-1967 season.

Format

This data frame contains the following columns:

goals a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
 Reep, C. and Pollard, R. and Benjamin, B. (1971), "Skill and chance in ball games", *Journal of the Royal Statistical Society, Series A, General*, **134**, 623–629

Examples

```
data(xmp06.13)
attach(xmp06.13)
table(goals) # compare to frequency table on p. 267
hist(goals, breaks = 0:12 - 0.5, las = 1, col = "lightgray")
negBinom.MoM <- function(x) {
  ## method of moments estimates for negative binomial distribution
  xbar <- mean(x)
  mnSqDev <- mean((x - xbar)^2)
  c(p = xbar/mnSqDev, r = xbar^2/(mnSqDev - xbar))
}
print(goals.MoM <- negBinom.MoM(goals))
## MLE's
optim(goals.MoM, function(x)
  -sum(dnbinom(goals, p = x[1], size = x[2], log = TRUE)))
## would have been better to use a transformation of p
detach()
```

xmp07.06

data from Example 7.6

Description

The xmp07.06 data frame has 48 rows and 1 column.

Format

This data frame contains the following columns:

Voltage the AC breakdown voltage (kV) of a circuit

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1995), Testing practices for the AC breakdown voltage testing of insulation liquids, *IEEE Electrical Insulation Magazine*, 21-26.

Examples

```
data(xmp07.06)
boxplot(xmp07.06,
  main = "AC Breakdown Voltage (kV)")
# t.test gives a 95% confidence interval on the mean
t.test(xmp07.06)
```

xmp07.11

data from Example 7.11

Description

The xmp07.11 data frame has 16 rows and 1 columns.

Format

This data frame contains the following columns:

Elasticity modulus of elasticity (MPa) obtained 1 minute after loading on Scotch pine lumber specimens.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1996), Time-dependent bending properties of lumber, *J. of Testing and Evaluation*, 187-193.

See Also

[xmp09.10](#)

Examples

```
data(xmp07.11)
boxplot(xmp07.11)
with(xmp07.11, qqnorm(Elasticity))
with(xmp07.11, qqline(Elasticity))
with(xmp07.11, t.test(Elasticity))
```

`xmp07.15`*data from Example 7.15*

Description

The `xmp07.15` data frame has 17 rows and 1 columns.

Format

This data frame contains the following columns:

voltage breakdown voltage of electrically stressed circuits

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp07.15)
boxplot(xmp07.15, main = "Breakdown voltage")
with(xmp07.15, qqnorm(voltage, main = "Breakdown voltage"))
with(xmp07.15, qqline(voltage))
attach(xmp07.15)
var(voltage) * (length(voltage) - 1) /
  qchisq(c(0.975, 0.025), df = length(voltage) - 1)
detach()
```

`xmp08.08`*data from Example 8.8*

Description

The `xmp08.08` data frame has 52 rows and 1 columns.

Format

This data frame contains the following columns:

DCP dynamic cone penetrometer readings (mm/blow) for a certain type of pavement.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
(1999), Probabilistic model for the analysis of dynamic cone penetrometer test values in pavement structure evaluation, *J. Testing and Evaluation*, 7-14.

Examples

```

data(xmp08.08)
boxplot(xmp08.08, main = "DCP readings")
attach(xmp08.08)
hist(DCP, breaks = 8, prob = TRUE)
rug(DCP)
lines(density(DCP), col = "blue")
t.test(DCP, alt = "less", mu = 30)

```

xmp09.04

data from Example 9.4

Description

The xmp09.04 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Type a factor with levels Graded No-fines

Sample.Size a numeric vector

Sample.Average.Conductivity a numeric vector

Sample.Standard.Deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```

data(xmp09.04)

```

xmp09.06

data from Example 9.6

Description

The xmp09.06 data frame has 2 rows and 4 columns.

Format

This data frame contains the following columns:

Fabric.Type a factor with levels Cotton Triacetate

Sample.Size a numeric vector

Sample.Mean a numeric vector

Sample.Standard.Deviation a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp09.06)
```

xmp09.08	<i>data from Example 9.8</i>
----------	------------------------------

Description

The xmp09.08 data frame has 6 rows and 2 columns.

Format

This data frame contains the following columns:

bottom a numeric vector

surface a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp09.08)
boxplot(xmp09.08, main = "Boxplot of data from Example 9.8")
attach(xmp09.08)
boxplot(bottom-surface, main = "Boxplot of differences from Example 9.8")
t.test(bottom, surface, alt = "greater", paired = TRUE)
detach()
```

xmp09.09	<i>data from Example 9.9</i>
----------	------------------------------

Description

The xmp09.09 data frame has 16 rows and 4 columns.

Format

This data frame contains the following columns:

Subject a numeric vector

Before a numeric vector

After a numeric vector

Difference a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp09.09)
boxplot(xmp09.09[, c("Before", "After")],
        main = "Data from Example 9.9")
attach(xmp09.09)
boxplot(Difference, main = "Differences in Example 9.9")
qqnorm(Difference,
        main = "Normal probability plot (compare Figure 9.5, p. 377)")
t.test(Difference)
t.test(Before, After, paired = TRUE) # same test
detach()
```

xmp09.10

data from Example 9.10

Description

The xmp09.10 data frame has 16 rows and 3 columns.

Format

This data frame contains the following columns:

t1.min modulus of elasticity (MPa) obtained 1 minute after loading on Scotch pine lumber specimens.

t4.wks modulus of elasticity (MPa) obtained 4 weeks after loading on Scotch pine lumber specimens.

Difference a numeric vector of the differences in the modulus of elasticity (MPa)

Details

This is an extended version of the data from Example 7.11.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1996), Time-dependent bending properties of lumber, *J. of Testing and Evaluation*, 187-193.

See Also

[xmp07.11](#)

Examples

```
data(xmp09.10)
boxplot(xmp09.10[, c("t1.min", "t4.wks")],
        main = "Data from Example 9.10")
attach(xmp09.10)
## compare to Figure 9.7, page 379
qqnorm(Difference, main = "Differences from Example 9.10",
        ylab = "Difference in modulus of elasticity")
qqline(Difference)
t.test(Difference, conf = 0.99)
t.test(t1.min, t4.wks, paired = TRUE, conf = 0.99) # same thing
detach()
```

xmp10.01

data from Example 10.1

Description

The xmp10.01 data frame has 24 rows and 2 columns.

Format

This data frame contains the following columns:

strength a numeric vector

type a factor with levels A B C D

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp10.01)
boxplot(strength ~ type, data = xmp10.01,
        main = "Data from Example (compare Figure 10.1, p. 405)")
fm1 <- lm( strength ~ type, data = xmp10.01 ) # fit anova model
qqnorm(resid(fm1), main = "Compare to Figure 10.2, p. 407")
anova(fm1)      # compare results in Example 10.2, p. 409
```

xmp10.03

data from Example 10.3

Description

The xmp10.03 data frame has 15 rows and 2 columns.

Format

This data frame contains the following columns:

Soiling a numeric vector

Mixture a numeric vector

Details

Data from an experiment comparing the degree of soiling for fabric copolymerized with three different mixtures of methacrylic acid.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1983), “Chemical factors affecting soiling and soil release from cotton DP fabric”, *American Dyestuff Reporter*, 25-30.

Examples

```
data(xmp10.03)
xmp10.03$Mixture <- factor(xmp10.03$Mixture)
plot(Soiling ~ Mixture, data = xmp10.03, col = "lightgray",
     main = "Data from Example 10.3")
summary(xmp10.03)           # check ranges and balance
fm1 <- lm(Soiling ~ Mixture, data = xmp10.03)
anova(fm1)                 # compare to table shown on p. 412
```

xmp10.05

data from Example 10.5

Description

The xmp10.05 data frame has 20 rows and 2 columns of data from an experiment on the effect of alcohol on REM sleep time

Format

This data frame contains the following columns:

REMtime a numeric vector giving the rapid eye movement (REM) sleep time for each rat during a 24-hour period

ethanol a numeric vector giving the concentration of ethanol (alcohol) per body weight administered to the rat (g/kg)

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1978), "Relationship of ethanol blood level to REM and non-REM sleep time and distribution in the rat", *Life Sciences*, 839-846.

Examples

```
data(xmp10.05)
plot(REMtime ~ ethanol, data = xmp10.05,
      xlab = "Ethanol concentration administered (g/kg)",
      ylab = "Amount of REM sleep during a 24 hour period")
fm1 <- lm(REMtime ~ factor(ethanol), data = xmp10.05)
anova(fm1)      # compare with Table 10.4, p. 417
summary(fm1)    # differences with baseline (0 g/kg)
## more appropriate to use an ordered factor
fm2 <- lm(REMtime ~ ordered(ethanol), data = xmp10.05)
anova(fm2)      # same as above
summary(fm2)    # polynomial contrasts
## best model uses square root of ethanol concentration
plot(REMtime ~ sqrt(ethanol), data = xmp10.05,
      xlab = expression(sqrt(
        plain("Ethanol concentration administered (g/kg)")),
      ylab = "Amount of REM sleep during a 24 hour period")
fm3 <- lm(REMtime ~ sqrt(ethanol), data = xmp10.05)
summary(fm3)
abline(fm3)
anova(fm3, fm1) # lack of fit test
opar <- par(mfrow = c(2,2))
plot(fm3, main = "Continuous fit to data in Example 10.5")
par(opar)
```

xmp10.08

data from Example 10.8

Description

The xmp10.08 data frame has 22 rows and 2 columns of data on the elastic modulus of Mg-based alloys obtained by a new ultrasonic process for specimens produced using three different casting processes.

Usage

```
data(xmp10.08)
```

Format

This data frame contains the following columns:

elastic a numeric vector of the elastic modulus (GPa)

type a factor indicating the casting process with levels Die, Permanent, and Plaster

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

References

(1998), “On the development of a new approach for the determination of yield strength in Mg-based alloys”, *Light Metal Age*, Oct. 51–53.

Examples

```
data(xmp10.08)
str(xmp10.08)
fm1 <- aov(elastic ~ type, data = xmp10.08)
anova(fm1)
```

xmp10.10

data from Example 10.10

Description

The xmp10.10 data frame has 18 rows and 2 columns.

Format

This data frame contains the following columns:

travel a numeric vector giving the travel time for ultrasonic head-waves in the rail (nanoseconds).
The value given is the original travel time minus 36,100 nanoseconds.

Rail an ordered factor identifying the rail on which the measurement was made.

Details

Data from a study of travel time for a certain type of wave that results from longitudinal stress of rails used for railroad track.

Source

Devore, J. L. (2000), *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury, Boston, MA.

Pinheiro, J. C. and Bates, D. M. (2000), *Mixed-Effects Models in S and S-PLUS*, Springer, New York. (Appendix A.26)

(1985), “Zero-force travel-time parameters for ultrasonic head-waves in railroad rail”, *Materials Evaluation*, 854-858.

Examples

```
data(xmp10.10)
xmp10.10$Rail <- factor(xmp10.10$Rail)
boxplot(travel ~ Rail, xmp10.10, col = "lightgray",
        xlab = "Rail", ylab = "Zero-force travel time (microsec)",
        main = "Travel times in rails, from example 10.10")
fm1 <- lm(travel ~ Rail, data = xmp10.10)
anova(fm1)
```

xmp11.01

data from Example 11.1

Description

The xmp11.01 data frame has 12 rows and 3 columns from an experiment on the effect of different washing treatments in removing marks from an erasable pen.

Format

This data frame contains the following columns:

strength a quantitative indicator of the overall specimen color change; the lower this value, the more marks were removed.

brand a numeric vector identifying the brand of erasable pen used.

treatment a numeric vector identifying the washing treatment.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
 (1991), “An assessment of the effects of treatment, time, and heat on the removal of erasable pen marks from cotton and cotton/polyester blend fabrics”, *J. of Testing and Evaluation*, 394-397.

Examples

```

data(xmp11.01)
xmp11.01$brand <- factor(xmp11.01$brand)
xmp11.01$treatment <- factor(xmp11.01$treatment)
plot(strength ~ treatment, data = xmp11.01, col = "lightgray",
     main = "Interaction plot for Example 11.01",
     xlab = "Washing treatment")
lines(strength ~ as.integer(treatment), data = xmp11.01,
     subset = brand == 1, col = 4, type = "b")
lines(strength ~ as.integer(treatment), data = xmp11.01,
     subset = brand == 2, col = 2, type = "b")
lines(strength ~ as.integer(treatment), data = xmp11.01,
     subset = brand == 3, col = 3, type = "b")
legend(3, 0.9, paste("Brand", 1:3), col = c(4, 2, 3), lty = 1)
fm1 <- lm(strength ~ brand + treatment, data = xmp11.01)
anova(fm1)      # compare to table 11.1, page 439

```

xmp11.05

data from Example 11.5

Description

The xmp11.05 data frame has 20 rows and 3 columns of data from an experiment on energy consumption of dehumidifiers.

Format

This data frame contains the following columns:

power the estimated annual power consumption (kwh) of the dehumidifier

humid the level of humidity at which the dehumidifier is tested. Larger numbers correspond to more humid conditions.

brand the brand of dehumidifier.

Details

This is a randomized blocked experiment.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```

data(xmp11.05)
plot(power ~ humid, data = xmp11.05, col = "lightgray",
     xlab = "Level of humidity",
     ylab = "Estimated annual power consumption (kwh)",
     main = "Data from Example 11.5")
lines(power ~ as.integer(humid), data = xmp11.05,
      subset = brand == 1, col = 2, type = "b")
lines(power ~ as.integer(humid), data = xmp11.05,
      subset = brand == 2, col = 3, type = "b")
lines(power ~ as.integer(humid), data = xmp11.05,
      subset = brand == 3, col = 4, type = "b")
lines(power ~ as.integer(humid), data = xmp11.05,
      subset = brand == 4, col = 5, type = "b")
lines(power ~ as.integer(humid), data = xmp11.05,
      subset = brand == 5, col = 6, type = "b")
legend(0.6, 1010, paste("Brand", 1:5), col = 1 + (1:5),
      lty = 1)
fm1 <- lm(power ~ humid + brand, data = xmp11.05)
anova(fm1) # compare with Table 11.3, page 442
summary(fm1)

```

xmp11.06

data from Example 11.6

Description

The xmp11.06 data frame has 24 rows and 3 columns.

Format

This data frame contains the following columns:

Resp a numeric vector of the mean number of responses emitted by each subject during single and compound stimuli presentations over a 4-day period.

Stimulus a numeric vector of stimulus levels. These levels correspond to L1 (moderate intensity light), L2 (low intensity light), T (tone), L1+L2, L1+T, and L2+T.

Subject a numeric vector identifying the subject (rat).

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1971), "Compounding of discriminative stimuli from the same and different sensory modalities", *J. Experimental Analysis and Behavior*, 337-342

Examples

```

data(xmp11.06)
plot(Resp ~ Stimulus, data = xmp11.06, col = "lightgray",
     main = "Data from Example 11.6",
     ylab = "Mean number of responses")
for (i in seq(along = levels(xmp11.06$Subject))) {
  attach(xmp11.06[ xmp11.06$Subject == i, ])
  lines(Resp ~ as.integer(Stimulus), col = i+1, type = "b")
}
legend(0.8, 95, paste("Subject", levels(xmp11.06$Subject)),
      col = 1 + seq(along = levels(xmp11.06$Subject)),
      lty = 1)
fm1 <- lm(Resp ~ Stimulus + Subject, data = xmp11.06)
anova(fm1) # compare to Table 11.5, page 443
attach(xmp11.06)
means <- sort(tapply(Resp, Stimulus, mean))
means
diff(means) # successive differences
qtukey(0.95, nmeans = 6, df = 15) #for Tukey comparisons
detach()

```

xmp11.07

data from Example 11.7

Description

The xmp11.07 data frame has 36 rows and 3 columns from an experiment on the growth of different varieties of tomato plants at different planting densities.

Format

This data frame contains the following columns:

Yield a numeric vector giving the yields for each plot

Variety a numeric vector coding the variety.

Density a numeric vector giving the planting density (thousands of plants per hectare).

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1976), "Effects of plant density on tomato yields in western Nigeria", *Experimental Agriculture*, 43-47.

Examples

```

data(xmp11.07)
plot(Yield ~ Density, data = xmp11.07, col = "lightgray",
     main = "Data from Example 11.7, page 450",
     xlab = "Density (plants/hectare)")
means <- sapply(split(xmp11.07, xmp11.07$Density),
                function(x) tapply(x$Yield, x$Variety, mean))
round(means, 2)
lines(1:4, means[1, ], col = 4, type = "b")
lines(1:4, means[2, ], col = 2, type = "b")
lines(1:4, means[3, ], col = 3, type = "b")
legend(0.4, 21.2, levels(xmp11.07$Variety), lty = 2,
      col = c(4, 2, 3))
fm1 <- lm(Yield ~ Variety * Density, data = xmp11.07)
anova(fm1) # compare with Table 11.7, page 452
fm2 <- update(fm1, . ~ Variety + Density) # additive model
anova(fm2)
sort(tapply(xmp11.07$Yield, xmp11.07$Variety, mean))

```

xmp11.11

data from Example 11.11

Description

The xmp11.11 data frame has 96 rows and 4 columns giving data on the heat tolerance of cattle under different conditions.

Format

This data frame contains the following columns:

Temp_r observed body temperature of the cattle (degrees Fahrenheit - 100)

Period a numeric vector indicating the period of the year

Strain a numeric vector indicating the strain of cattle

Coat a numeric vector indicating the coat type

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1959), "The significance of the coat in hear tolerance of cattle", *Australian J. Agricultural Research*, 744-748.

Examples

```

data(xmp11.11)
coplot(Tempr ~ as.integer(Period) | Strain * Coat,
       data = xmp11.11, show.given = FALSE)
coplot(Tempr ~ as.integer(Strain) | Period * Coat,
       data = xmp11.11, show.given = FALSE)
coplot(Tempr ~ as.integer(Coat) | Period * Strain,
       data = xmp11.11, show.given = FALSE)
fm1 <- lm(Tempr ~ Period * Strain * Coat, xmp11.11)
anova(fm1) # compare with Table 11.8, page 461

```

xmp11.12

data from Example 11.12

Description

The xmp11.12 data frame has 36 rows and 4 columns.

Format

This data frame contains the following columns:

abrasion a numeric vector
row a numeric vector
column a numeric vector
humidity a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1946), “The abrasion of leather”, *J. Inter. Soc. Leather Trades’ Chemists*, 287.

Examples

```

data(xmp11.12)
xmp11.12$row <- ordered(xmp11.12$row)
xmp11.12$column <- ordered(xmp11.12$column)
xmp11.12$humidity <- ordered(xmp11.12$humidity)
attach(xmp11.12) # to check the design
table(row, column)
table(row, humidity)
table(humidity, column)
detach()
fm1 <- lm(abrasion ~ row + column + humidity, xmp11.12)
anova(fm1) # compare with Table 11.9, page 464

```

xmp11.13

data from Example 11.13

Description

The xmp11.13 data frame has 16 rows and 4 columns.

Format

This data frame contains the following columns:

Strength a numeric vector

age a numeric vector

tempture a numeric vector

soil a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp11.13)
fm1 <- lm(Strength ~ age * tempture * soil, xmp11.13)
anova(fm1) # compare with Table 11.12, page 471
```

xmp11.16

data from Example 11.16

Description

The xmp11.16 data frame has 16 rows and 6 columns of data from a blocked, 2³ replicated factorial design.

Format

This data frame contains the following columns:

strength strength of the product solution (arbitrary units).

tempture reactor temperature - coded as ± 1 .

gas gas throughput - coded as ± 1 .

conc concentration of active constituent - coded as ± 1 .

block block in which the experiment was run.

Source

(1951), Factorial experiments in pilot plant studies, *Industrial and Engineering Chemistry*, 1300–1306.

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp11.16)
## leave -1/+1 encoding for experimental factors, convert block
fm1 <- aov(strength ~ tempture * gas * conc + block,
           data = xmp11.16)
summary(fm1)      # anova table
```

xmp12.01

data from Example 12.1

Description

The xmp12.01 data frame has 30 rows and 2 columns.

Format

This data frame contains the following columns:

palprebal width of the palprebal fissure (cm).

OSA Ocular Surface Area, a measure of vertical gaze direction (cm²).

Details

These are data from an experiment relating the vertical gaze direction, as measured by the ocular surface area, to the width of the palprebal fissure (horizontal width of the eye opening).

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
 (1996), “Analysis of ocular surface area for comfortable VDT workstation layout”, *Ergonomics*, 877-884.

Examples

```
data(xmp12.01)
plot(OSA ~ palprebal, data = xmp12.01,
     xlab = "Palprebal fissure width (cm)",
     ylab = expression(paste(plain("Ocular surface area (cm")^2,
                               plain(")"))),
     main = "Data from Example 12.1, page 490", las = 1)
summary(xmp12.01)
fm1 <- lm(OSA ~ palprebal, data = xmp12.01)
```

```
summary(fm1)
abline(fm1)
opar <- par(mfrow = c(2,2))
plot(fm1)
par(opar)
```

xmp12.02

data from Example 12.2

Description

The xmp12.02 data frame has 19 rows and 2 columns.

Format

This data frame contains the following columns:

soil.pH pH of the soil at the test site.

dieback mean crown dieback at the test site (%).

Details

These data are from an observational study of the mean crown dieback, a measure of the growth retardation in sugar maples, and the soil pH.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
(1995) "Relationships among crown condition, growth, and stand nutrition in seven northern Vermont sugarbushes", *Canadian Journal of Forest Research*, 386–397

Examples

```
data(xmp12.02)
plot(dieback ~ soil.pH, data = xmp12.02,
     xlab = "soil pH", ylab = "mean crown dieback (%)",
     main = "Data from Example 12.2, page 491")
fm1 <- lm(dieback ~ soil.pH, data = xmp12.02)
abline(fm1)
summary(fm1)
opar <- par(mfrow = c(2,2))
plot(fm1)
par(opar)
```

xmp12.04 *data from Example 12.4*

Description

The xmp12.04 data frame has 15 rows and 2 columns.

Format

This data frame contains the following columns:

weight unit weight of the concrete specimen (pcf).

porosity porosity (%) of the concrete specimen.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
 (1995) "Pavement thickness design for no-fines concrete parking lots" *J. of Transportation Engineering*, 476-484.

Examples

```
data(xmp12.04)
plot(porosity ~ weight, data = xmp12.04,
     xlab = "Unit weight (pcf) of concrete specimen",
     ylab = "Porosity (%)",
     main = "Data from Example 12.4, page 500")
fm1 <- lm(porosity ~ weight, data = xmp12.04)
abline(fm1)
summary(fm1)
opar <- par(mfrow = c(2,2))
plot(fm1)
par(opar)
```

xmp12.06 *data from Example 12.6*

Description

The xmp12.06 data frame has 11 rows and 2 columns.

Format

This data frame contains the following columns:

traffic traffic flow (1000's of cars per 24 hours)

lead lead content of bark of trees near the highway ($\mu\text{g/g}$ dry wt).

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp12.06)
plot(lead ~ traffic, data = xmp12.06,
     xlab = "Traffic flow (1000's of cars per 24 hours)",
     ylab = expression(paste(plain("Lead content of tree bark ("),
                               mu, plain("g/g dry wt)"))),
     main = "Data from Example 12.6, page 503", las = 1)
fm1 <- lm(lead ~ traffic, data = xmp12.06)
abline(fm1)
summary(fm1)
opar <- par(mfrow = c(2, 2))
plot(fm1)
par(opar)
## compare to table on page 503
cbind(xmp12.06, yhat = fitted(fm1), resid = resid(fm1))
anova(fm1)
```

xmp12.08

data from Example 12.8

Description

The xmp12.08 data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

strength fracture strength, as a percentage of the ultimate tensile strength.

attenuat attenuation or decrease in the amplitude of the stress wave (neper/cm).

Details

Data from a study to investigate how the propagation of an ultrasonic stress wave through a substance depends on the properties of the substance. The test substance was fiberglass-reinforced polyester composites.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury
 (1985), "Promising quantitative nondestructive evaluation techniques for composite materials", *Materials Evaluation*, 561-565.

Examples

```
data(xmp12.08)
plot(attenuat ~ strength, data = xmp12.08,
     xlab = "Fracture strength (% of ultimate tensile strength)",
     ylab = "Attenuation (neper/cm)",
     main = "Data from Example 12.8, page 504")
fm1 <- lm(attenuat ~ strength, data = xmp12.08)
abline(fm1)
summary(fm1)
opar <- par(mfrow = c(2, 2))
plot(fm1)
par(opar)
anova(fm1)
```

xmp12.10

data from Example 12.10

Description

The xmp12.10 data frame has 15 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp12.10)
```

xmp12.11

data from Example 12.11

Description

The xmp12.11 data frame has 20 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp12.11)
```

xmp12.12

data from Example 12.12

Description

The xmp12.12 data frame has 18 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp12.12)
```

`xmp12.14`*data from Example 12.14*

Description

The `xmp12.14` data frame has 8 rows and 2 columns.

Format

This data frame contains the following columns:

x a numeric vector

y a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp12.14)
```

`xmp12.15`*data from Example 12.15*

Description

The `xmp12.15` data frame has 16 rows and 2 columns.

Format

This data frame contains the following columns:

ozone a numeric vector

carbon a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp12.15)
```

xmp13.01

*data from Example 13.1***Description**

The xmp13.01 data frame has 14 rows and 2 columns.

Format

This data frame contains the following columns:

rate a numeric vector

emission a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp13.01)
plot(emission ~ rate, data = xmp13.01,
     xlab = "Burner area liberation rate",
     ylab = expression(plain("NO")["x"]*
                       plain("emissions")), las = 1,
     main = "Data from Example 13.1, page 545")
fm1 <- lm(emission ~ rate, data = xmp13.01)
abline(fm1) # plot 1, Figure 13.1
if (require(MASS)) {
  sres <- stdres(fm1)
  plot(sres ~ fitted(fm1), ylab = "Standardized residuals",
       xlab = "Fitted values") # plot 2, Figure 13.1
  abline(h = 0, lty = 2, lwd = 0) # horizontal reference
}
plot(resid(fm1) ~ fitted(fm1), ylab = "Residuals",
     xlab = "Fitted values") # alternative plot 2
abline(h = 0, lty = 2, lwd = 0) # horizontal reference
plot(fitted(fm1) ~ emission, data = xmp13.01)
abline(0, 1) # plot 3, Figure 13.1
if (require(MASS)) {
  plot(sres ~ rate, data = xmp13.01) # plot 4
  abline(h = 0, lty = 2, lwd = 0)
  qqnorm(sres) # plot 5
} else {
  plot(resid(fm1) ~ rate, data = xmp13.01) # plot 4
  qqnorm(resid(fm1)) # plot 5
}
## The residuals versus fitted plot and the normal
## probability plot of the standardized residuals
plot(fm1, which = 1:2)
```

xmp13.03 *data from Example 13.3*

Description

The xmp13.03 data frame has 12 rows and 2 columns of data on tool lifetime versus cutting time.

Format

This data frame contains the following columns:

time the cutting time (unknown units).

ToolLife tool lifetime (unknown units).

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1967) “The effect of experimental error on the determination of optimum metal cutting conditions”, *J. Eng. for Industry*, 315–322.

Examples

```
data(xmp13.03)
plot(ToolLife ~ time, data = xmp13.03)
plot(ToolLife ~ time, data = xmp13.03, log = "xy")
fm1 <- lm(log(ToolLife) ~ I(log(time)), data = xmp13.03)
summary(fm1)
plot(fm1, which = 1)     # plot of residuals versus fitted values
plot(exp(fitted(fm1)) ~ xmp13.03$ToolLife,
      xlab = "y", ylab = expression(hat("y")),
      main = "Compare to Figure 13.4, page 555")
abline(0, 1)            # reference line
```

xmp13.04 *data from Example 13.4*

Description

The xmp13.04 data frame has 11 rows and 2 columns on the ethylene content of lettuce seeds as a function of exposure time to an ethylene absorbent.

Format

This data frame contains the following columns:

time exposure to an ethylene absorbent (min).

Ethylene ethylene content of the seeds (nL/g dry wt).

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1972), "Ethylene synthesis in lettuce seeds: Its physiological significance", *Plant Physiology*, 719-722.

Examples

```
data(xmp13.04)
plot(Ethylene ~ time, data = xmp13.04,
     xlab = "Exposure time (min)",
     ylab = "Ethylene content (nL/g dry wt)",
     main = "Compare to Figure 13.5 (a), page 556")
fm1 <- lm(Ethylene ~ time, data = xmp13.04)
abline(fm1)
plot(resid(fm1) ~ xmp13.04$time)
abline(h = 0, lty = 2)
title(main = "Compare to Figure 13.5 (b), page 556")
title(sub = "Using raw residuals instead of standardized")
fm2 <- lm(log(Ethylene) ~ time, data = xmp13.04)
plot(resid(fm2) ~ xmp13.04$time)
abline(h = 0, lty = 2)
title(main = "Compare to Figure 13.6 (a), page 557")
title(sub = "Using raw residuals instead of standardized")
summary(fm2)
plot(exp(fitted(fm2)) ~ xmp13.04$Ethylene)
```

xmp13.05

data from Example 13.5

Description

The xmp13.05 data frame has 24 rows and 2 columns of data on space shuttle launches.

Format

This data frame contains the following columns:

Temperature launch temperature (degrees Fahrenheit).

Failure a factor with levels N and Y indicating the incidence of failure of O-rings.

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```

data(xmp13.05)
fm1 <- glm(Failure ~ Temperature,
           data = xmp13.05, family = "binomial")
## results are different from JMP results in Figure 13.8
summary(fm1)
temp <- seq(55, 85, len = 101) # for doing the prediction
plot(
  predict(fm1, new = list(Temperature = temp), type = "resp") ~ temp,
  main = "Compare with Figure 13.8, page 560", type = "l",
  ylab = "P(F)")

```

xmp13.06

data from Example 13.6

Description

The xmp13.06 data frame has 16 rows and 2 columns on the yield of paddy (a grain farmed in India) versus the time of harvest.

Format

This data frame contains the following columns:

days date of harvesting (number of days after flowering).

yield yield (kg/ha) of paddy

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury (1975), "Determination of biological maturity and effect of harvesting and drying conditions on milling quality of paddy", *J. Agricultural Eng. Research*, 353-361

Examples

```

data(xmp13.06)
plot(yield ~ days, data = xmp13.06,
     main = "Compare to Figure 13.10, page 564")
fm1 <- lm(yield ~ days + I(days^2), data = xmp13.06)
summary(fm1)
anova(fm1)
predict(fm1, list(days = 25), interval = "conf")
predict(fm1, list(days = 25), interval = "pred")

```

 xmp13.09

data from Example 13.9

Description

The xmp13.09 data frame has 8 rows and 2 columns of data on cure temperature and ultimate sheer strength of rubber compounds.

Format

This data frame contains the following columns:

tempture cure temperature (degrees Fahrenheit).

strength ultimate sheer strength (psi)

Source

Devore, J. L. (2003) *Probability and Statistics for Engineering and the Sciences (6th ed)*, Duxbury (1971), "A method for improving the accuracy of polynomial regression analysis", *J. Quality Technology*, 149–155.

Examples

```
data(xmp13.09)
plot(strength ~ tempture, data = xmp13.09)
fm1 <- lm(strength ~ tempture + I(tempture^2), data = xmp13.09)
summary(fm1)
xmp13.09$Tcentered <- scale(xmp13.09$tempture, scale = FALSE)
fm2 <- lm(strength ~ Tcentered + I(Tcentered^2), data = xmp13.09)
summary(fm2)
## another approach using orthogonal polynomials
fm3 <- lm(strength ~ poly(tempture, 2), data = xmp13.09)
summary(fm3)
```

 xmp13.11

data from Example 13.11

Description

The xmp13.11 data frame has 30 rows and 6 columns giving the ball bond shear strength from a wire bonding process and several covariates.

Format

This data frame contains the following columns:

Observation observation number (not used).

Force force (gm).

Power power (mw).

Temperature temperature (degrees Celsius).

Time time (ms).

Strength ball bond strength (gm).

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Vardeman, S. (1994) *Statistics Engineering Problem Solving*,

Examples

```
data(xmp13.11)
fm1 <- lm(Strength ~ Force + Power + Temperature + Time,
         data = xmp13.11)
summary(fm1)
anova(fm1)
```

xmp13.12

data from Example 13.12

Description

The xmp13.12 data frame has 9 rows and 5 columns of data on characteristics of concrete.

Format

This data frame contains the following columns:

x1 the % limestone powder.

x2 the water-cement ratio.

x1x2 the interaction of limestone powder and water-cement ratio.

strength the 28-day compressive strength (MPa).

absorbability the absorbability (%).

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp13.12)
fm1 <- lm(strength ~ x1 * x2, data = xmp13.12)
summary(fm1)
```

xmp13.14

data from Example 13.14

Description

The xmp13.14 data frame has 13 rows and 3 columns.

Format

This data frame contains the following columns:

index a numeric vector

iron a numeric vector

aluminum a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp13.14)
```

xmp13.15

data from Example 13.15

Description

The xmp13.15 data frame has 30 rows and 5 columns.

Format

This data frame contains the following columns:

press a numeric vector

HCHO a numeric vector

catalyst a numeric vector

temp a numeric vector

time a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp13.15)
```

xmp13.17

data from Example 13.17

Description

The xmp13.17 data frame has 27 rows and 3 columns.

Format

This data frame contains the following columns:

life a numeric vector

speed a numeric vector

load a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp13.17)
```

xmp13.18

data from Example 13.18

Description

The xmp13.18 data frame has 31 rows and 3 columns.

Format

This data frame contains the following columns:

tar a numeric vector

speed a numeric vector

tempture a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp13.18)
```

xmp13.22	<i>data from Example 13.22</i>
----------	--------------------------------

Description

The xmp13.22 data frame has 10 rows and 3 columns.

Format

This data frame contains the following columns:

Strength a numeric vector

Sp.grav. a numeric vector

Moisture a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp13.22)
```

xmp14.03	<i>data from Example 14.3</i>
----------	-------------------------------

Description

The xmp14.03 data frame has 24 rows and 1 columns.

Format

This data frame contains the following columns:

onset a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp14.03)
```

xmp14.10	<i>data from Example 14.10</i>
----------	--------------------------------

Description

The xmp14.10 data frame has 49 rows and 1 columns.

Format

This data frame contains the following columns:

Cholstrl a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp14.10)
```

xmp14.13	<i>data from Example 14.13</i>
----------	--------------------------------

Description

The xmp14.13 data frame has 3 rows and 6 columns.

Format

This data frame contains the following columns:

Production.Line a numeric vector

Blemish a numeric vector

Crack a numeric vector

Location a numeric vector

Missing a numeric vector

Other a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp14.13)
```

```
xmp14.14
```

```
data from Example 14.14
```

Description

The xmp14.14 data frame has 3 rows and 3 columns.

Format

This data frame contains the following columns:

Substand a numeric vector

Standard a numeric vector

Modern a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp14.14)
```

```
xmp15.01
```

```
data from Example 15.1
```

Description

The xmp15.01 data frame has 15 rows and 1 columns.

Format

This data frame contains the following columns:

C1 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp15.01)
```

xmp15.02	<i>data from Example 15.2</i>
----------	-------------------------------

Description

The xmp15.02 data frame has 8 rows and 5 columns.

Format

This data frame contains the following columns:

Log a numeric vector

Solvent.1 a numeric vector

Solvent.2 a numeric vector

Difference a numeric vector

Signed.rank a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp15.02)
```

xmp15.03	<i>data from Example 15.3</i>
----------	-------------------------------

Description

The xmp15.03 data frame has 25 rows and 2 columns.

Format

This data frame contains the following columns:

xi a numeric vector

Signed.Rank a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp15.03)
```

xmp15.04

data from Example 15.4

Description

The xmp15.04 data frame has 12 rows and 2 columns.

Format

This data frame contains the following columns:

conc a numeric vector

Area a factor with levels Polluted Unpolluted

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp15.04)
```

xmp15.06

data from Example 15.6

Description

The xmp15.06 data frame has 28 rows and 1 columns.

Format

This data frame contains the following columns:

metabole a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp15.06)
```

xmp15.08	<i>data from Example 15.8</i>
----------	-------------------------------

Description

The xmp15.08 data frame has 11 rows and 2 columns.

Format

This data frame contains the following columns:

strength a numeric vector

type a factor with levels Epoxy Other

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp15.08)
```

xmp15.09	<i>data from Example 15.9</i>
----------	-------------------------------

Description

The xmp15.09 data frame has 7 rows and 5 columns.

Format

This data frame contains the following columns:

X4.inch a numeric vector

X6.inch a numeric vector

X8.inch a numeric vector

X10.inch a numeric vector

X12.inch a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp15.09)
```

xmp15.10	<i>data from Example 15.10</i>
----------	--------------------------------

Description

The xmp15.10 data frame has 32 rows and 3 columns.

Format

This data frame contains the following columns:

potential a numeric vector

emotion a numeric vector

subject a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp15.10)
```

xmp16.01	<i>data from Example 16.1</i>
----------	-------------------------------

Description

The xmp16.01 data frame has 25 rows and 3 columns.

Format

This data frame contains the following columns:

visc1 a numeric vector

visc2 a numeric vector

visc3 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp16.01)
```

xmp16.04	<i>data from Example 16.4</i>
----------	-------------------------------

Description

The xmp16.04 data frame has 22 rows and 4 columns.

Format

This data frame contains the following columns:

resist1 a numeric vector

resist2 a numeric vector

resist3 a numeric vector

resist4 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp16.04)
```

xmp16.06	<i>data from Example 16.6</i>
----------	-------------------------------

Description

The xmp16.06 data frame has 25 rows and 1 columns.

Format

This data frame contains the following columns:

defects a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp16.06)
```

`xmp16.07`*data from Example 16.7*

Description

The `xmp16.07` data frame has 24 rows and 1 columns.

Format

This data frame contains the following columns:

flaws a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp16.07)
```

`xmp16.08`*data from Example 16.8*

Description

The `xmp16.08` data frame has 16 rows and 4 columns.

Format

This data frame contains the following columns:

obs1 a numeric vector

obs2 a numeric vector

obs3 a numeric vector

obs4 a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp16.08)
```

`xmp16.09`*data from Example 16.9*

Description

The xmp16.09 data frame has 16 rows and 6 columns.

Format

This data frame contains the following columns:

Sample a numeric vector

xwl a numeric vector

xwl...40.15 a numeric vector

dl a numeric vector

xwl...39.85 a numeric vector

el a numeric vector

Source

Devore, J. L. (2000) *Probability and Statistics for Engineering and the Sciences (5th ed)*, Duxbury

Examples

```
data(xmp16.09)
```

Index

*Topic **datasets**

ex01.11, [9](#)
ex01.12, [9](#)
ex01.15, [10](#)
ex01.17, [11](#)
ex01.18, [11](#)
ex01.19, [12](#)
ex01.20, [12](#)
ex01.21, [13](#)
ex01.23, [13](#)
ex01.24, [14](#)
ex01.25, [14](#)
ex01.27, [15](#)
ex01.28, [15](#)
ex01.29, [16](#)
ex01.32, [16](#)
ex01.33, [17](#)
ex01.34, [17](#)
ex01.35, [18](#)
ex01.36, [18](#)
ex01.37, [19](#)
ex01.38, [19](#)
ex01.39, [20](#)
ex01.43, [20](#)
ex01.44, [21](#)
ex01.45, [21](#)
ex01.46, [22](#)
ex01.49, [22](#)
ex01.50, [23](#)
ex01.51, [23](#)
ex01.54, [24](#)
ex01.56, [24](#)
ex01.59, [25](#)
ex01.60, [25](#)
ex01.63, [26](#)
ex01.64, [26](#)
ex01.65, [27](#)
ex01.67, [27](#)
ex01.70, [28](#)

ex01.71, [28](#)
ex01.73, [29](#)
ex01.75, [29](#)
ex01.78, [30](#)
ex01.81, [30](#)
ex04.80, [31](#)
ex04.84, [31](#)
ex04.86, [32](#)
ex04.87, [33](#)
ex06.01, [33](#)
ex06.02, [34](#)
ex06.03, [34](#)
ex06.04, [35](#)
ex06.05, [35](#)
ex06.06, [36](#)
ex06.09, [36](#)
ex06.15, [37](#)
ex06.25, [37](#)
ex07.10, [38](#)
ex07.26, [38](#)
ex07.33, [39](#)
ex07.37, [39](#)
ex07.43, [40](#)
ex07.44, [40](#)
ex07.45, [41](#)
ex07.47, [41](#)
ex07.54, [42](#)
ex07.56, [42](#)
ex08.32, [43](#)
ex08.53, [43](#)
ex08.55, [44](#)
ex08.64, [44](#)
ex08.68, [45](#)
ex08.78, [45](#)
ex09.07, [46](#)
ex09.11, [46](#)
ex09.16, [47](#)
ex09.23, [47](#)
ex09.25, [48](#)

- ex09.27, 48
- ex09.29, 49
- ex09.30, 49
- ex09.31, 50
- ex09.32, 50
- ex09.33, 51
- ex09.36, 51
- ex09.37, 52
- ex09.38, 52
- ex09.39, 53
- ex09.40, 53
- ex09.41, 54
- ex09.43, 54
- ex09.44, 55
- ex09.63, 55
- ex09.65, 56
- ex09.66, 56
- ex09.68, 57
- ex09.70, 57
- ex09.72, 58
- ex09.76, 58
- ex09.77, 59
- ex09.78, 59
- ex09.79, 60
- ex09.84, 60
- ex09.86, 61
- ex09.90, 61
- ex10.06, 62
- ex10.08, 62
- ex10.09, 63
- ex10.18, 63
- ex10.22, 64
- ex10.26, 64
- ex10.27, 65
- ex10.32, 65
- ex10.36, 66
- ex10.37, 66
- ex10.41, 67
- ex10.42, 67
- ex10.44, 68
- ex11.02, 69
- ex11.03, 69
- ex11.04, 70
- ex11.05, 70
- ex11.08, 71
- ex11.09, 71
- ex11.10, 72
- ex11.15, 72
- ex11.16, 73
- ex11.17, 73
- ex11.18, 74
- ex11.20, 74
- ex11.29, 75
- ex11.31, 75
- ex11.34, 76
- ex11.35, 76
- ex11.39, 77
- ex11.40, 77
- ex11.42, 78
- ex11.43, 78
- ex11.48, 79
- ex11.50, 80
- ex11.52, 80
- ex11.53, 81
- ex11.54, 81
- ex11.55, 82
- ex11.56, 82
- ex11.57, 83
- ex11.59, 83
- ex11.61, 84
- ex12.01, 84
- ex12.02, 85
- ex12.03, 85
- ex12.04, 86
- ex12.05, 86
- ex12.13, 87
- ex12.15, 87
- ex12.16, 88
- ex12.19, 88
- ex12.20, 89
- ex12.21, 89
- ex12.24, 90
- ex12.29, 90
- ex12.35, 91
- ex12.37, 91
- ex12.46, 92
- ex12.50, 92
- ex12.52, 93
- ex12.54, 93
- ex12.55, 94
- ex12.58, 94
- ex12.59, 95
- ex12.62, 95
- ex12.63, 96
- ex12.65, 96
- ex12.68, 97

- ex12.69, [97](#)
- ex12.71, [98](#)
- ex12.72, [98](#)
- ex12.73, [99](#)
- ex12.75, [99](#)
- ex13.02, [100](#)
- ex13.04, [100](#)
- ex13.06, [101](#)
- ex13.07, [101](#)
- ex13.08, [102](#)
- ex13.09, [102](#)
- ex13.14, [103](#)
- ex13.15, [103](#)
- ex13.16, [104](#)
- ex13.17, [104](#)
- ex13.18, [105](#)
- ex13.19, [105](#)
- ex13.21, [106](#)
- ex13.24, [106](#)
- ex13.25, [107](#)
- ex13.27, [107](#)
- ex13.29, [108](#)
- ex13.30, [108](#)
- ex13.31, [109](#)
- ex13.32, [109](#)
- ex13.33, [110](#)
- ex13.34, [110](#)
- ex13.35, [111](#)
- ex13.47, [111](#)
- ex13.48, [112](#)
- ex13.49, [112](#)
- ex13.50, [113](#)
- ex13.51, [113](#)
- ex13.52, [114](#)
- ex13.53, [114](#)
- ex13.64, [115](#)
- ex13.65, [115](#)
- ex13.66, [116](#)
- ex13.67, [116](#)
- ex13.69, [117](#)
- ex13.70, [117](#)
- ex13.71, [118](#)
- ex13.72, [118](#)
- ex14.09, [119](#)
- ex14.11, [119](#)
- ex14.12, [120](#)
- ex14.13, [120](#)
- ex14.14, [121](#)
- ex14.15, [121](#)
- ex14.16, [122](#)
- ex14.17, [122](#)
- ex14.18, [123](#)
- ex14.20, [123](#)
- ex14.21, [124](#)
- ex14.22, [124](#)
- ex14.23, [125](#)
- ex14.26, [125](#)
- ex14.27, [126](#)
- ex14.28, [126](#)
- ex14.29, [127](#)
- ex14.30, [127](#)
- ex14.31, [128](#)
- ex14.32, [128](#)
- ex14.38, [129](#)
- ex14.40, [129](#)
- ex14.41, [130](#)
- ex14.42, [130](#)
- ex14.44, [131](#)
- ex15.03, [131](#)
- ex15.04, [132](#)
- ex15.05, [132](#)
- ex15.08, [133](#)
- ex15.10, [133](#)
- ex15.11, [134](#)
- ex15.12, [134](#)
- ex15.13, [135](#)
- ex15.14, [135](#)
- ex15.15, [136](#)
- ex15.23, [136](#)
- ex15.24, [137](#)
- ex15.25, [137](#)
- ex15.26, [138](#)
- ex15.27, [138](#)
- ex15.28, [139](#)
- ex15.29, [139](#)
- ex15.30, [140](#)
- ex15.32, [140](#)
- ex15.33, [141](#)
- ex15.35, [141](#)
- ex16.05, [142](#)
- ex16.06, [142](#)
- ex16.09, [143](#)
- ex16.14, [143](#)
- ex16.25, [144](#)
- ex16.41, [144](#)
- ex16.43, [145](#)

- xmp01.01, [145](#)
- xmp01.02, [146](#)
- xmp01.06, [147](#)
- xmp01.10, [148](#)
- xmp01.11, [149](#)
- xmp01.15, [149](#)
- xmp01.16, [150](#)
- xmp01.18, [151](#)
- xmp01.19, [151](#)
- xmp04.28, [152](#)
- xmp04.29, [152](#)
- xmp04.30, [153](#)
- xmp06.02, [154](#)
- xmp06.03, [154](#)
- xmp06.12, [155](#)
- xmp06.13, [156](#)
- xmp07.06, [156](#)
- xmp07.11, [157](#)
- xmp07.15, [158](#)
- xmp08.08, [158](#)
- xmp09.04, [159](#)
- xmp09.06, [159](#)
- xmp09.08, [160](#)
- xmp09.09, [160](#)
- xmp09.10, [161](#)
- xmp10.01, [162](#)
- xmp10.03, [163](#)
- xmp10.05, [163](#)
- xmp10.08, [164](#)
- xmp10.10, [165](#)
- xmp11.01, [166](#)
- xmp11.05, [167](#)
- xmp11.06, [168](#)
- xmp11.07, [169](#)
- xmp11.11, [170](#)
- xmp11.12, [171](#)
- xmp11.13, [172](#)
- xmp11.16, [172](#)
- xmp12.01, [173](#)
- xmp12.02, [174](#)
- xmp12.04, [175](#)
- xmp12.06, [175](#)
- xmp12.08, [176](#)
- xmp12.10, [177](#)
- xmp12.11, [177](#)
- xmp12.12, [178](#)
- xmp12.14, [179](#)
- xmp12.15, [179](#)
- xmp13.01, [180](#)
- xmp13.03, [181](#)
- xmp13.04, [181](#)
- xmp13.05, [182](#)
- xmp13.06, [183](#)
- xmp13.09, [184](#)
- xmp13.11, [184](#)
- xmp13.12, [185](#)
- xmp13.14, [186](#)
- xmp13.15, [186](#)
- xmp13.17, [187](#)
- xmp13.18, [187](#)
- xmp13.22, [188](#)
- xmp14.03, [188](#)
- xmp14.10, [189](#)
- xmp14.13, [189](#)
- xmp14.14, [190](#)
- xmp15.01, [190](#)
- xmp15.02, [191](#)
- xmp15.03, [191](#)
- xmp15.04, [192](#)
- xmp15.06, [192](#)
- xmp15.08, [193](#)
- xmp15.09, [193](#)
- xmp15.10, [194](#)
- xmp16.01, [194](#)
- xmp16.04, [195](#)
- xmp16.06, [195](#)
- xmp16.07, [196](#)
- xmp16.08, [196](#)
- xmp16.09, [197](#)
- ex01.11, [9](#)
- ex01.12, [9](#)
- ex01.15, [10](#)
- ex01.17, [11](#)
- ex01.18, [11](#)
- ex01.19, [12](#)
- ex01.20, [12](#)
- ex01.21, [13](#)
- ex01.23, [13](#)
- ex01.24, [14](#)
- ex01.25, [14](#)
- ex01.27, [15](#)
- ex01.28, [15](#)
- ex01.29, [16](#)
- ex01.32, [16](#)
- ex01.33, [17](#)
- ex01.34, [17](#)

ex01.35, 18
ex01.36, 18
ex01.37, 19
ex01.38, 19
ex01.39, 20
ex01.43, 20
ex01.44, 21
ex01.45, 21
ex01.46, 22
ex01.49, 22
ex01.50, 23
ex01.51, 23
ex01.54, 24
ex01.56, 24
ex01.59, 25
ex01.60, 25
ex01.63, 26
ex01.64, 26
ex01.65, 27
ex01.67, 27
ex01.70, 28
ex01.71, 28
ex01.73, 29
ex01.75, 29
ex01.78, 30
ex01.81, 30
ex04.80, 31
ex04.84, 31
ex04.86, 32
ex04.87, 33
ex06.01, 33
ex06.02, 34
ex06.03, 34
ex06.04, 35
ex06.05, 35
ex06.06, 36
ex06.09, 36
ex06.15, 37
ex06.25, 37
ex07.10, 38
ex07.26, 38
ex07.33, 39
ex07.37, 39
ex07.43, 40
ex07.44, 40
ex07.45, 41
ex07.47, 41
ex07.54, 42
ex07.56, 42
ex08.32, 43
ex08.53, 43
ex08.55, 44
ex08.64, 44
ex08.68, 45
ex08.78, 45
ex09.07, 46
ex09.11, 46
ex09.16, 47
ex09.23, 47
ex09.25, 48
ex09.27, 48
ex09.29, 49
ex09.30, 49
ex09.31, 50
ex09.32, 50
ex09.33, 51
ex09.36, 51
ex09.37, 52
ex09.38, 52
ex09.39, 53
ex09.40, 53
ex09.41, 54
ex09.43, 54
ex09.44, 55
ex09.63, 55
ex09.65, 56
ex09.66, 56
ex09.68, 57
ex09.70, 57
ex09.72, 58
ex09.76, 58
ex09.77, 59
ex09.78, 59
ex09.79, 60
ex09.84, 60
ex09.86, 61
ex09.90, 61
ex10.06, 62
ex10.08, 62
ex10.09, 63
ex10.18, 63
ex10.22, 64
ex10.26, 64
ex10.27, 65
ex10.32, 65
ex10.36, 66

- ex10.37, 66
- ex10.41, 67
- ex10.42, 67
- ex10.44, 68
- ex11.02, 69
- ex11.03, 69
- ex11.04, 70
- ex11.05, 70
- ex11.08, 71
- ex11.09, 71
- ex11.10, 72
- ex11.15, 72
- ex11.16, 73
- ex11.17, 73
- ex11.18, 74
- ex11.20, 74
- ex11.29, 75
- ex11.31, 75
- ex11.34, 76
- ex11.35, 76
- ex11.39, 77
- ex11.40, 77
- ex11.42, 78
- ex11.43, 78
- ex11.48, 79
- ex11.50, 80
- ex11.52, 80
- ex11.53, 81
- ex11.54, 81
- ex11.55, 82
- ex11.56, 82
- ex11.57, 83
- ex11.59, 83
- ex11.61, 84
- ex12.01, 84
- ex12.02, 85
- ex12.03, 85
- ex12.04, 86
- ex12.05, 86
- ex12.13, 87
- ex12.15, 87
- ex12.16, 88
- ex12.19, 88
- ex12.20, 89
- ex12.21, 89
- ex12.24, 90
- ex12.29, 90
- ex12.35, 91
- ex12.37, 91
- ex12.46, 92
- ex12.50, 92
- ex12.52, 93
- ex12.54, 93
- ex12.55, 94
- ex12.58, 94
- ex12.59, 95
- ex12.62, 95
- ex12.63, 96
- ex12.65, 96
- ex12.68, 97
- ex12.69, 97
- ex12.71, 98
- ex12.72, 98
- ex12.73, 99
- ex12.75, 99
- ex13.02, 100
- ex13.04, 100
- ex13.06, 101
- ex13.07, 101
- ex13.08, 102
- ex13.09, 102
- ex13.14, 103
- ex13.15, 103
- ex13.16, 104
- ex13.17, 104
- ex13.18, 105
- ex13.19, 105
- ex13.21, 106
- ex13.24, 106
- ex13.25, 107
- ex13.27, 107
- ex13.29, 108
- ex13.30, 108
- ex13.31, 109
- ex13.32, 109
- ex13.33, 110
- ex13.34, 110
- ex13.35, 111
- ex13.47, 111
- ex13.48, 112
- ex13.49, 112
- ex13.50, 113
- ex13.51, 113
- ex13.52, 114
- ex13.53, 114
- ex13.64, 115

- ex13.65, 115
- ex13.66, 116
- ex13.67, 116
- ex13.69, 117
- ex13.70, 117
- ex13.71, 118
- ex13.72, 118
- ex14.09, 119
- ex14.11, 119
- ex14.12, 120
- ex14.13, 120
- ex14.14, 121
- ex14.15, 121
- ex14.16, 122
- ex14.17, 122
- ex14.18, 123
- ex14.20, 123
- ex14.21, 124
- ex14.22, 124
- ex14.23, 125
- ex14.26, 125
- ex14.27, 126
- ex14.28, 126
- ex14.29, 127
- ex14.30, 127
- ex14.31, 128
- ex14.32, 128
- ex14.38, 129
- ex14.40, 129
- ex14.41, 130
- ex14.42, 130
- ex14.44, 131
- ex15.03, 131
- ex15.04, 132
- ex15.05, 132
- ex15.08, 133
- ex15.10, 133
- ex15.11, 134
- ex15.12, 134
- ex15.13, 135
- ex15.14, 135
- ex15.15, 136
- ex15.23, 136
- ex15.24, 137
- ex15.25, 137
- ex15.26, 138
- ex15.27, 138
- ex15.28, 139
- ex15.29, 139
- ex15.30, 140
- ex15.32, 140
- ex15.33, 141
- ex15.35, 141
- ex16.05, 142
- ex16.06, 142
- ex16.09, 143
- ex16.14, 143
- ex16.25, 144
- ex16.41, 144
- ex16.43, 145
- xmp01.01, 145
- xmp01.02, 146
- xmp01.06, 147
- xmp01.10, 148
- xmp01.11, 149
- xmp01.15, 149
- xmp01.16, 150
- xmp01.18, 151
- xmp01.19, 151
- xmp04.28, 152
- xmp04.29, 152
- xmp04.30, 153
- xmp06.02, 154
- xmp06.03, 154
- xmp06.12, 155
- xmp06.13, 156
- xmp07.06, 156
- xmp07.11, 157, 162
- xmp07.15, 158
- xmp08.08, 158
- xmp09.04, 159
- xmp09.06, 159
- xmp09.08, 160
- xmp09.09, 160
- xmp09.10, 157, 161
- xmp10.01, 162
- xmp10.03, 163
- xmp10.05, 163
- xmp10.08, 164
- xmp10.10, 165
- xmp11.01, 166
- xmp11.05, 167
- xmp11.06, 168
- xmp11.07, 169
- xmp11.11, 170
- xmp11.12, 171

xmp11.13, 172
xmp11.16, 172
xmp12.01, 173
xmp12.02, 174
xmp12.04, 175
xmp12.06, 175
xmp12.08, 176
xmp12.10, 177
xmp12.11, 177
xmp12.12, 178
xmp12.14, 179
xmp12.15, 179
xmp13.01, 180
xmp13.03, 181
xmp13.04, 181
xmp13.05, 182
xmp13.06, 183
xmp13.09, 184
xmp13.11, 184
xmp13.12, 185
xmp13.14, 186
xmp13.15, 186
xmp13.17, 187
xmp13.18, 187
xmp13.22, 188
xmp14.03, 188
xmp14.10, 189
xmp14.13, 189
xmp14.14, 190
xmp15.01, 190
xmp15.02, 191
xmp15.03, 191
xmp15.04, 192
xmp15.06, 192
xmp15.08, 193
xmp15.09, 193
xmp15.10, 194
xmp16.01, 194
xmp16.04, 195
xmp16.06, 195
xmp16.07, 196
xmp16.08, 196
xmp16.09, 197