

# Package ‘pspearman’

February 15, 2012

**Title** Spearman’s rank correlation test

**Version** 0.2-5

**Date** 2009-06-19

**Author** Petr Savicky <savicky@cs.cas.cz>

**Maintainer** Petr Savicky <savicky@cs.cas.cz>

**Description** Spearman’s rank correlation test with precomputed exact null distribution for  $n \leq 22$ .

**License** GPL

**Repository** CRAN

**Date/Publication** 2009-06-19 06:52:36

## R topics documented:

pspearman . . . . .	1
spearman.test . . . . .	2

<b>Index</b>	<b>4</b>
--------------	----------

---

pspearman	<i>Distribution function of Spearman’s rho</i>
-----------	--

---

## Description

This function provides three types of approximations of the distribution function of Spearman’s rho. Besides the two approximations used in `cor.test(method="spearman")`, which are AS89 and the t-distribution, this function allows to use precomputed null distribution for  $n \leq 22$ .

## Usage

```
pspearman(s, n, lower.tail = TRUE,  
          approximation = c("exact", "AS89", "t-distribution"))
```

**Arguments**

`s` The observed value of S statistics  $\text{sum}((\text{rank}(x) - \text{rank}(y))^2)$ .

`n` The number of observations.

`lower.tail` If TRUE (the default), the probability of  $S \leq s$  is computed. If FALSE, the probability of  $S \geq s$  is computed.

`approximation` Selection of the method of approximation of the distribution function.

**Details**

See `spearman.test` for more detail.

**Value**

Depending on `lower.tail`, either the probability of  $S \leq s$  or of  $S \geq s$  is computed, where S is the statistics  $\text{sum}((\text{rank}(x) - \text{rank}(y))^2)$ .

**Examples**

```
pspearman(36, 10, approximation="exact") # [1] 0.005265377
pspearman(36, 10, approximation="AS89") # [1] 0.005825634
```

---

`spearman.test`

*Spearman's rank correlation test with precomputed null distribution*

---

**Description**

This function is a modification of the part of the function `cor.test()`, which evaluates Spearman's rank correlation test. Besides the two approximations used in `cor.test(method="spearman")`, which are AS89 and the t-distribution, this function allows to use precomputed null distribution for  $n \leq 22$ .

**Usage**

```
spearman.test(x, y,
  alternative = c("two.sided", "less", "greater"),
  approximation = c("exact", "AS89", "t-distribution"))
```

**Arguments**

`x`, `y`, `alternative` have the same meaning as in `cor.test`. See the corresponding help page.

`approximation` selection of the method to approximate the null distribution

## Details

Calculation of the null distribution of Spearman's rank correlation statistics is exponentially hard in  $n$ . This package uses precomputed exact distribution for  $n \leq 22$ . The computation was done using Ryser's formula applied to an appropriate monomial permanent as described in *M.A. van de Wiel and A. Di Bucchianico, Fast computation of the exact null distribution of Spearman's rho and Page's L statistic for samples with and without ties, J. Stat. Plann. Inf. 92 (2001), pp. 133-145.* using code written by the author of the package. The resulting distributions are identical to those computed by an independent program kindly provided by M.A. van de Wiel.

## Value

A list with class "htest" with the same structure as the value of the function `cor.test(method="spearman")`. Except of the p-value, also the contents is identical.

## Examples

```
x <- 1:10
y <- c(5:1, 6, 10:7)
out1 <- spearman.test(x, y)
out2 <- spearman.test(x, y, approximation="AS89")
out3 <- cor.test(x, y, method="spearman")
out1$p.value # [1] 0.05443067 this is the exact value
out2$p.value # [1] 0.05444507 approximation obtained from AS89
out3$p.value # [1] 0.05444507 dtto (R-2.9.0 and older versions have 0.05169460 here)
```

# Index

\*Topic **distribution**

pspearman, 1

\*Topic **htest**

spearman.test, 2

pspearman, 1

spearman.test, 2