Package 'ANSM5'

May 6, 2026

Title Functions and Data for the Book ``Applied Nonparametric Statistical Methods", 5th Edition

Version 1.1.1

Description Functions and data to accompany the 5th edition of the book ``Applied Nonparametric Statistical Methods" (4th edition: Sprent & Smeeton, 2024, ISBN:158488701X), the revisions from the 4th edition including a move from describing the output from a miscellany of statistical software packages to using R. While the output from many of the functions can also be obtained using a range of other R functions, this package provides functions in a unified setting and give output using both p-values and confidence intervals, exemplifying the book's approach of treating p-values as a guide to statistical importance and not an end product in their own right. Please note that in creating the ANSM5 package we do not claim to have produced software which is necessarily the most computationally efficient nor the most comprehensive.

Encoding UTF-8

RoxygenNote 7.2.1

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

Imports stats

Depends R (>= 2.10)

LazyData true

License GPL (>= 3)

NeedsCompilation no

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Repository CRAN

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Contents

`ansari.bradley` *Perform Ansari-Bradley test*

Description

`ansari.bradley()` performs the Ansari-Bradley test and is used in chapter 6 of "Applied Non-parametric Statistical Methods" (5th edition)

Usage

```
ansari.bradley(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 25,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

x	Numeric vector
y	Numeric vector
H0	Null hypothesis value (defaults to NULL)
alternative	Type of alternative hypothesis (defaults to two.sided)
max.exact.cases	Maximum number of cases allowed for exact calculations (defaults to 25)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 6.12 from "Applied Nonparametric Statistical Methods" (5th edition)
ansari.bradley(ch6$typeA, ch6$typeB)

# Exercise 6.16 from "Applied Nonparametric Statistical Methods" (5th edition)
ansari.bradley(ch6$travel, ch6$politics)
```

---

app1 *Data in Appendix 1*

Description

Data in Appendix 1 of "Applied Nonparametric Statistical Methods" (5th edition)

- McAlpha (used in example 4.5)
- McBeta (used in example 6.6)
- McGamma (used in exercise 4.1, example 6.6)
- McDelta (used in examples 10.4, 10.8, exercise 10.5)

Usage

```
app1
```

Format

app1:
A list with 4 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

`binom` *Perform Binomial test*

Description

`binom()` performs the Binomial test and calculates the Binomial confidence interval and is used in chapters 4, 5 and 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
binom(
  r,
  n,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.cases = 1e+07,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = TRUE
)
```

Arguments

`r`	Number of successes
`n`	Number of trials
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`CI.width`	Confidence interval width (defaults to `0.95`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10000000`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.CI`	Boolean indicating whether or not to perform confidence interval calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 4.6 from "Applied Nonparametric Statistical Methods" (5th edition)
binom(3, 20)

# Exercise 5.8 from "Applied Nonparametric Statistical Methods" (5th edition)
binom(24, 40, 0.5)
```

`blomqvist` *Calculate Blomqvist coefficient*

Description

`blomqvist()` calculates the Blomqvist coefficient and is used in chapter 10 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
blomqvist(
  x,
  y,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 1000,
  nsims.mc = 1e+05,
  seed = NULL,
  do.exact = TRUE,
  do.mc = FALSE
)
```

Arguments

`x`	Numeric vector of same length as y
`y`	Numeric vector of same length as x
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `1000`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Example 10.9 from "Applied Nonparametric Statistical Methods" (5th edition)
blomqvist(ch10$q1, ch10$q2, alternative = "greater")

# Exercise 10.7 from "Applied Nonparametric Statistical Methods" (5th edition)
blomqvist(ch10$ERA, ch10$SSS)
```

`bowker` *Perform Bowker's extension of McNemar's test*

Description

`bowker()` performs the Bowker's extension of McNemar's test and is used in chapter 12 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
bowker(x, y = NULL, do.asymp = TRUE)
```

Arguments

`x`	Factor of same length as y, or two-dimensional square table
`y`	Factor of same length as x (or NULL if x is table) (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 12.12 from "Applied Nonparametric Statistical Methods" (5th edition)
bowker(ch12$side.effect.new, ch12$side.effect.old)

# Exercise 12.12 from "Applied Nonparametric Statistical Methods" (5th edition)
bowker(ch12$first.response, ch12$second.response)
```

`breslow.day` *Perform Breslow and Day test*

Description

`breslow.day()` performs the Breslow and Day test and is used in chapter 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
breslow.day(x, y, z, CI.width = 0.95, do.asymp = TRUE, do.CI = TRUE)
```

Arguments

`x`	Binary factor of same length as y, z
`y`	Binary factor of same length as x, z
`z`	Factor of same length as x, y
`CI.width`	Confidence interval width (defaults to `0.95`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `TRUE`)
`do.CI`	Boolean indicating whether or not to perform confidence interval calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 13.3 from "Applied Nonparametric Statistical Methods" (5th edition)
breslow.day(ch13$machine, ch13$output.status, ch13$material.source)

# Exercise 13.7 from "Applied Nonparametric Statistical Methods" (5th edition)
breslow.day(ch13$medicine, ch13$response, ch13$location)
```

bs *Create bootstrap confidence interval*

Description

`bs()` creates a bootstrap confidence interval and is used in chapter 14 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
bs(x, y = NULL, CI.width = 0.95, nsims.bs = 10000, seed = NULL)
```

Arguments

`x`	Numeric vector
`y`	Numeric vector or NULL (defaults to `NULL`)
`CI.width`	Confidence interval width (defaults to `0.95`)
`nsims.bs`	Number of bootstrap samples to be taken (defaults to `10000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)

Value

A list object object with the results from applying the function

Examples

```
# Example 14.5 from "Applied Nonparametric Statistical Methods" (5th edition)
bs(ch14$example14.2, nsims.bs = 2000, CI.width = 0.95, seed = 1)
bs(ch14$example14.2, nsims.bs = 2000, CI.width = 0.99, seed = 1)
```

ch10 *Data used in Chapter 10*

Description

Data used in Chapter 10 of "Applied Nonparametric Statistical Methods" (5th edition)

- q1 (used in section 10.1.2, examples 10.2, 10.5, 10.9)
- q2 (used in section 10.1.2, examples 10.2, 10.5, 10.9)
- death.year (used in examples 10.4, 10.8)
- diving.rank (used in example 10.10)
- competitors (used in example 10.10)

- judges (used in example 10.10)
- dentistA (used in example 10.11)
- dentistB (used in example 10.11)
- questionnaire (used in example 10.12, exercise 10.13)
- demonstration (used in example 10.12, exercise 10.13)
- gender (used in exercise 10.13)
- items (used in example 10.12)
- ERA (used in exercises 10.1, 10.3, 10.6, 10.7)
- ESMS (used in exercises 10.1, 10.3, 10.6)
- SSS (used in exercise 10.7)
- British (used in example 10.8, exercise 10.10)
- American (used in example 10.8, exercise 10.10)
- Canadian (used in example 10.9, exercise 10.10)
- Australian (used in example 10.9, exercise 10.10)
- design (used in exercise 10.10)
- country (used in exercise 10.10)
- marks (used in exercise 10.11)
- script (used in exercise 10.11)
- examiner (used in exercise 10.11)
- observerA (used in exercise 10.12)
- observerB (used in exercise 10.12)

Usage

```
ch10
```

Format

`ch10`**:**
A list with 26 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

ch11 *Data used in Chapter 11*

Description

Data used in Chapter 11 of "Applied Nonparametric Statistical Methods" (5th edition)

- parentlimit (used in examples 11.2, 11.3, 11.4, 11.6)
- reportedtime (used in examples 11.2, 11.3, 11.4, 11.6)
- age (used in example 11.5)
- length (used in example 11.5)
- parentlimit.2 (used in example 11.7)
- reportedtime.2 (used in example 11.7)
- days.stored (used in exercise 11.3)
- rotten (used in exercise 11.3)
- ERA (used in exercise 11.6)
- ESMS (used in exercise 11.6)
- depth (used in exercise 11.8)
- ammonia (used in exercise 11.8)
- food.weight.A (used in exercise 11.9)
- weight.gain.A (used in exercise 11.9)
- food.weight.B (used in exercise 11.9)
- weight.gain.B (used in exercise 11.9)
- SW.England (used in exercise 11.10)
- N.Scotland (used in exercise 11.10)

Usage

```
ch11
```

Format

ch11**:**
A list with 18 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

ch12 *Data used in Chapter 12*

Description

Data used in Chapter 12 of "Applied Nonparametric Statistical Methods" (5th edition)

- feedback.freq (used in example 12.1)
- PPI.person (used in example 12.1)
- infection.site (used in examples 12.2, 12.3)
- district (used in examples 12.2, 12.3)
- drugYZ (used in example 12.4)
- side.effect (used in example 12.4)
- drugAB (used in example 12.5)
- side.effect.level (used in example 12.5)
- time.to.failure (used in example 12.6)
- cause (used in example 12.6)
- dose (used in examples 12.7, 12.8)
- dose.side.effect (used in example 12.7, 12.8)
- platelet.count (used in examples 12.9)
- spleen.size (used in example 12.9)
- last.digits (used in example 12.10)
- accidents (used in example 12.11)
- accidents.reduced (used in example 12.11)
- side.effect.new (used in example 12.12)
- side.effect.old (used in example 12.12)
- bronchitis (used in exercise 12.1)
- otitis.media (used in exercise 12.1)
- welsh.language (used in exercise 12.2)
- opportunities (used in exercise 12.2)
- diagnosis (used in exercise 12.3)
- position.played (used in exercise 12.3)
- PPI.person.2 (used in exercise 12.4)
- feedback.satisfaction (used in exercise 12.4)
- win.opinion (used in exercise 12.5)
- supporter (used in exercise 12.5)
- diabetes.status (used in exercise 12.6)
- ethnic.group (used in exercise 12.6)

- horse.wins (used in exercise 12.7)
- F1.wins (used in exercise 12.8)
- strokes (used in exercise 12.9)
- recurrent.visits (used in exercise 12.10)
- holes (used in exercise 12.11)
- first.response (used in exercise 12.12)
- second.response (used in exercise 12.12)

Usage

```
ch12
```

Format

`ch12`**:**
A list with 38 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

`ch13` *Data used in Chapter 13*

Description

Data used in Chapter 13 of "Applied Nonparametric Statistical Methods" (5th edition)

- physical.activity (used in examples 13.1, 13.2, exercise 13.2)
- tv.viewing (used in examples 13.1, 13.2, exercise 13.2)
- gender (used in examples 13.1, 13.2, exercise 13.2)
- machine (used in example 13.3)
- output.status (used in example 13.3)
- material.source (used in example 13.3)
- drug (used in example 13.4, section 13.2.5)
- side.effects (used in example 13.4, section 13.2.5)
- age.group (used in example 13.4, section 13.2.5)
- dose (used in examples 13.7, 13.8)
- dose.side.effect (used in examples 13.7, 13.8)
- alcohol (used in example 13.9)
- malformation (used in example 13.9)
- frequency (used in example 13.10)

- person (used in example 13.10)
- medicine (used in exercise 13.7, section 13.3.1)
- response (used in exercise 13.7, section 13.3.1)
- location (used in exercise 13.7, section 13.3.1)
- chemo.drug (used in example 13.12)
- chemo.side.effect (used in example 13.12)
- group (used in section 13.4)
- promoted (used in section 13.4)
- company (used in section 13.4)
- breakfast.eaten (used in exercise 13.3)
- VEL (used in exercise 13.3)
- boys.girls (used in exercise 13.3)
- cholesterol (used in exercise 13.4)
- SBP (used in exercise 13.4)
- schooling (used in exercise 13.5)
- abortion.attitude (used in exercise 13.5)
- PPI.ages (used in exercise 13.9)
- PPI.people (used in exercise 13.9)
- laid.off (used in exercises 13.10, 13.11)
- employee.ages (used in exercise 13.10)
- employee.ages.2 (used in exercise 13.11)

Usage

```
ch13
```

Format

`ch13`**:**
A list with 35 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

ch14 *Data used in Chapter 14*

Description

Data used in Chapter 14 of "Applied Nonparametric Statistical Methods" (5th edition)

- example14.2 (used in examples 14.2, 14.5)
- X14.4 (used in exercise 14.4)
- Y14.4 (used in exercise 14.4)

Usage

```
ch14
```

Format

`ch14`**:**
A list with 3 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

ch15 *Data used in Chapter 15*

Description

Data used in Chapter 15 of "Applied Nonparametric Statistical Methods" (5th edition)

- diet (used in section 15.3.5)
- BMI (used in section 15.3.1)
- wgt.VLCD (used in section 15.3.2)
- wgt.norm (used in section 15.3.2)
- opdiff (used in section 15.3.5)
- optime.VLCD (used in sections 15.3.3, 15.3.6)
- optime.norm (used in sections 15.3.3, 15.3.6)
- los.VLCD (used in section 15.3.6)
- los.norm (used in section 15.3.6)
- optime (used in section 15.3.4)
- los (used in section 15.3.4)

Usage

```
ch15
```

Format

ch15**:**
A list with 11 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

---

ch3 *Data used in Chapter 3*

Description

Data used in Chapter 3 of "Applied Nonparametric Statistical Methods" (5th edition)

- sampleI (used in examples 3.1, 3.2, 3.3, exercise 3.17)
- sampleII (used in examples 3.1, 3.2, 3.3, exercise 3.17)
- heartrates1 (used in examples 3.4, 3.11)
- heartrates2 (used in examples 3.5, 3.6, 3.7)
- withties (used in example 3.8)
- tiedifrounded1 (used in example 3.8)
- tiedifrounded2 (used in example 3.8)
- ages (used in example 3.8, exercise 3.9)
- sampleA (used in example 3.12)
- sampleB (used in examples 3.12, 3.13)
- sampleA2 (used in example 3.12)
- sampleA3 (used in example 3.12)
- heartrates2a (used in example 3.14)
- heartrates2b (used in example 3.14)
- sampleIa (used in exercise 3.1)
- parkingtime (used in exercise 3.3)
- Svals (used in exercise 3.4)
- children (used in exercise 3.6)
- fishlengths (used in exercises 3.7, 3.11)
- sleeptime (used in exercise 3.10)
- weightloss (used in exercise 3.12)
- plants (used in exercise 3.13)
- birthprops (used in exercise 3.14)
- assembly (used in exercise 3.15)
- weightchange (used in exercise 3.16)

Usage

```
ch3
```

Format

`ch3`**:**
A list with 25 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

---

ch4 *Data used in Chapter 4*

Description

Data used in Chapter 4 of "Applied Nonparametric Statistical Methods" (5th edition)

- breaks (used in example 4.2)
- ages (used in example 4.4)
- precipitation (used in example 4.13)
- tosses1 (used in example 4.14)
- tosses2 (used in example 4.14)
- tosses3 (used in example 4.14)
- births (used in example 4.15)
- times.as.degrees (used in example 4.16)
- dates.as.degrees (used in example 4.17)
- waiting.time (used in exercise 4.2)
- visiting.supporters (used in exercise 4.3)
- days.waiting (used in exercise 4.8)
- rainfall.by.latitude (used in exercise 4.9)
- points (used in exercise 4.10)
- rainfall.DRC (used in exercise 4.11)
- piped.water.DRC (used in exercise 4.12)
- accident.bearings (used in exercise 4.13)
- board.angles (used in exercise 4.14)
- arrow.angles (used in exercise 4.15)
- football.results (used in exercise 4.17)

Usage

```
ch4
```

Format

ch4:
A list with 20 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

---

ch5 *Data used in Chapter 5*

Description

Data used in Chapter 5 of "Applied Nonparametric Statistical Methods" (5th edition)

- LVF (used in example 5.1, exercise 6.2)
- RVF (used in example 5.1, exercise 6.2)
- arithmetic (used in example 5.2)
- bp (used in example 5.3)
- bp.incorrect (used in example 5.3)
- yr0910 (used in example 5.10)
- yr1314 (used in example 5.10)
- bp.diff (used in exercise 5.1)
- LabI (used in exercise 5.2)
- LabII (used in exercise 5.2)
- parent (used in exercise 5.4)
- online (used in exercise 5.5)
- lectures (used in exercise 5.5)
- additiveA (used in exercise 5.9)
- additiveB (used in exercise 5.9)
- round2 (used in exercise 5.10)
- round3 (used in exercise 5.10)
- pollA (used in exercise 5.11)
- pollB (used in exercise 5.11)
- kHz0.125 (used in exercise 5.12)
- kHz0.25 (used in exercise 5.12)

Usage

```
ch5
```

Format

ch5:
A list with 21 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

---

ch6 *Data used in Chapter 6*

Description

Data used in Chapter 6 of "Applied Nonparametric Statistical Methods" (5th edition)

- groupA (used in examples 6.1, 6.2, 6.3, 6.10, 6.17)
- groupB (used in examples 6.1, 6.2, 6.3, 6.10, 6.17)
- groupA.sch2 (used in example 6.4)
- groupB.sch2 (used in example 6.4)
- groupA.sch2.grp (used in example 6.5)
- groupB.sch2.grp (used in example 6.5)
- males (used in examples 6.7, 6.8)
- females (used in examples 6.7, 6.8)
- sampleI (used in example 6.9)
- sampleII (used in example 6.9)
- typeA (used in examples 6.11, 6.12, 6.13, exercises 6.11, 6.12)
- typeB (used in examples 6.11, 6.12, 6.13, exercises 6.11, 6.12)
- groupI (used in example 6.14)
- groupII (used in example 6.14)
- groupI.trimmed (used in example 6.14)
- groupI.amended (used in example 6.14)
- salivaF (used in examples 6.15, 6.16)
- salivaM (used in examples 6.15, 6.16)
- sex (used in example 6.18)
- temp.H (used in exercise 6.1)
- temp.L (used in exercise 6.1)

- DMF.M (used in exercise 6.3)
- DMF.F (used in exercise 6.3)
- weight.diabetic (used in exercise 6.4)
- weight.normal (used in exercise 6.4)
- cooling.time.standard (used in exercise 6.5)
- cooling.time.cheap (used in exercise 6.5)
- wait.1979 (used in exercise 6.6)
- wait.1983 (used in exercise 6.6)
- activity.boys (used in exercise 6.7)
- activity.girls (used in exercise 6.7)
- time.withoutLD (used in exercises 6.13, 6.14)
- time.withLD (used in exercises 6.13, 6.14)
- doseI (used in exercise 6.15)
- doseII (used in exercise 6.15)
- doseI.2 (used in exercise 6.15)
- travel (used in exercise 6.16)
- politics (used in exercise 6.16)
- twins (used in exercise 6.17)

Usage

```
ch6
```

Format

`ch6`**:**
A list with 39 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

ch7 *Data used in Chapter 7*

Description

Data used in Chapter 7 of "Applied Nonparametric Statistical Methods" (5th edition)

- affordability (used in example 7.1, exercise 7.16)
- regions (used in example 7.1, exercise 7.16)
- age (used in example 7.2)
- positions (used in example 7.2)
- dementia.age (used in examples 7.3, 7.9)
- features (used in examples 7.3, 7.9)
- time (used in examples 7.4, 7.5)
- surgeon (used in examples 7.4, 7.5)
- pulse (used in example 7.6)
- student (used in example 7.6)
- time.period (used in example 7.6)
- nodes (used in example 7.7)
- treatment (used in example 7.7)
- block (used in example 7.7)
- outcome (used in example 7.8)
- member (used in example 7.8)
- climb (used in example 7.8)
- procedure.time (used in example 7.10)
- team.member (used in example 7.10)
- sentences (used in exercise 7.2)
- author (used in exercise 7.2)
- head.width (used in exercise 7.4)
- species (used in exercise 7.4)
- braking.distance (used in exercise 7.5)
- speed (used in exercise 7.5)
- platelet.count (used in exercise 7.6)
- spleen.size (used in exercise 7.6)
- liver.weight (used in exercise 7.7)
- dose (used in exercise 7.7)
- house (used in exercise 7.7)
- mark (used in exercise 7.8)

- scheme (used in exercise 7.8)
- candidate (used in exercise 7.8)
- prem.contractions (used in exercise 7.9)
- drug (used in exercise 7.9)
- patient (used in exercise 7.9)
- births (used in exercise 7.11)
- week (used in exercise 7.11)
- weekday (used in exercise 7.11)
- names.recalled (used in exercise 7.12)
- group (used in exercise 7.12)
- medical.student (used in exercise 7.12)
- soc.media.use (used in exercise 7.14)
- participant (used in exercise 7.14)
- day (used in exercise 7.14)
- braking.distance.2 (used in exercise 7.15)
- initial.speed (used in exercise 7.15)

Usage

```
ch7
```

Format

`ch7`**:**
A list with 47 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

---

ch8 *Data used in Chapter 8*

Description

Data used in Chapter 8 of "Applied Nonparametric Statistical Methods" (5th edition)

- plant.weight (used in example 8.2)
- growth.hormone (used in examples 8.6, 8.7)
- undersoil.heating (used in examples 8.6, 8.7)
- plant.weight.2 (used in example 8.6)
- plant.weight.3 (used in examples 8.4, 8.5)

- plant.weight.4 (used in example 8.7)
- sequence (used in example 8.9)
- periodI (used in example 8.9)
- periodII (used in example 8.9)
- sentences (used in example 8.10)
- authors (used in example 8.10)
- prey.preference (used in example 8.11)
- prey (used in example 8.11)
- larva (used in example 8.11)
- game.time (used in exercise 8.3)
- experience (used in exercise 8.3)
- game (used in exercise 8.3)
- periodI.mistakes.AB (used in exercise 8.6)
- periodII.mistakes.AB (used in exercise 8.6)
- periodI.mistakes.BA (used in exercise 8.6)
- periodII.mistakes.BA (used in exercise 8.6)
- periodI.time.AB (used in exercise 8.7)
- periodII.time.AB (used in exercise 8.7)
- periodI.time.BA (used in exercise 8.7)
- periodII.time.BA (used in exercise 8.7)
- seizure.score (used in exercises 8.8, 8.9)
- hospital (used in exercises 8.8, 8.9)
- silver.content (used in exercise 8.10)
- dynasty (used in exercise 8.10)

Usage

```
ch8
```

Format

`ch8`**:**
A list with 29 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

ch9 *Data used in Chapter 9*

Description

Data used in Chapter 9 of "Applied Nonparametric Statistical Methods" (5th edition)

- symp.survtime (used in examples 9.1, 9.3)
- symp.censor (used in examples 9.1, 9.3)
- asymp.survtime (used in examples 9.1, 9.3)
- asymp.censor (used in examples 9.1, 9.3)
- sampleI.survtime (used in following example 9.3, example 9.4)
- sampleI.censor (used in example 9.4)
- sampleII.survtime (used in example 9.4)
- sampleII.survtime.2 (used in following example 9.3)
- sampleII.censor (used in example 9.4)
- samplesAB.survtime (used in example 9.6)
- samplesAB.censor (used in example 9.6)
- samplesAB (used in example 9.6)
- samplesXYZ.survtime (used in example 9.7)
- samplesXYZ.censor (used in example 9.7)
- samplesXYZ (used in example 9.7)
- boys.toothtime (used in exercise 9.2)
- girls.toothtime (used in exercise 9.2)
- regimeA.survtime (used in exercises 9.5, 9.6)
- regimeA.censor (used in exercises 9.5, 9.6)
- regimeB.survtime (used in exercises 9.5, 9.6)
- regimeB.censor (used in exercises 9.5, 9.6)
- bulbA (used in exercise 9.8)
- bulbB (used in exercise 9.8)

Usage

```
ch9
```

Format

ch9**:**
A list with 23 data vectors

Source

"Applied Nonparametric Statistical Methods" (5th edition)

`chisqtest.ANSM` *Perform Chi-squared test*

Description

`chisqtest.ANSM()` is a wrapper for chisq.test() from the `stats` package - performs the Chi-squared test and is used in chapters 12 and 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
chisqtest.ANSM(
  x,
  y = NULL,
  p = NULL,
  cont.corr = TRUE,
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.exact = TRUE,
  do.asymp = FALSE,
  do.mc = FALSE
)
```

Arguments

`x`	Factor of same length as y, or table
`y`	Factor of same length as x (or NULL if x is table) (defaults to `NULL`)
`p`	Vector of probabilities (expressed as numbers between 0 and 1 and summing to 1) of same length as x or NULL (defaults to `NULL`)
`cont.corr`	Boolean indicating whether or not to use continuity correction (defaults to `TRUE`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 12.1 from "Applied Nonparametric Statistical Methods" (5th edition)
chisqtest.ANSM(ch12$feedback.freq, ch12$PPI.person, do.exact = FALSE, do.asymp = TRUE)

# Exercise 13.7 from "Applied Nonparametric Statistical Methods" (5th edition)
chisqtest.ANSM(ch13$medicine[ch13$location == "Rural"],
  ch13$response[ch13$location == "Rural"], seed = 1)
```

---

cochran.q *Perform Cochran Q test*

Description

`cochran.q()` performs the Cochran Q test and is used in chapter 7 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
cochran.q(
  y,
  groups,
  blocks,
  max.exact.perms = 1e+05,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`y`	Binary vector of same length as groups, blocks
`groups`	Factor of same length as y, blocks with levels such that length(y) == nlevels(groups) * nlevels(blocks)
`blocks`	Factor of same length as y, groups with levels such that length(y) == nlevels(groups) * nlevels(blocks)
`max.exact.perms`	Maximum number of permutations allowed for exact calculations (defaults to `100000`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 7.8 from "Applied Nonparametric Statistical Methods" (5th edition)
cochran.q(ch7$outcome, ch7$climb, ch7$member, do.exact = FALSE, do.asymp = TRUE)

# Exercise 7.14 from "Applied Nonparametric Statistical Methods" (5th edition)
cochran.q(ch7$soc.media.use, ch7$participant, ch7$day, do.exact = FALSE, do.asymp = TRUE)
```

---

cohen.kappa *Calculate Cohen's kappa*

Description

`cohen.kappa()` calculates Cohen's kappa and is used in chapter 10 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
cohen.kappa(
  y1,
  y2,
  blocks = NULL,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = FALSE,
  do.mc = FALSE
)
```

Arguments

`y1`	Factor of same length as y2, blocks and same levels as y2 and (if blocks not NULL) with 2 levels
`y2`	Factor of same length as y1, blocks and same levels as y1 and (if blocks not NULL) with 2 levels
`blocks`	Factor of same length as y1, y2 or NULL (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`CI.width`	Confidence interval width (defaults to `0.95`)

max.exact.cases
: Maximum number of cases allowed for exact calculations (defaults to 10)

nsims.mc
: Number of Monte Carlo simulations to be performed (defaults to 100000)

seed
: Random number seed to be used for Monte Carlo simulations (defaults to NULL)

do.asymp
: Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)

do.exact
: Boolean indicating whether or not to perform exact calculations (defaults to TRUE)

do.CI
: Boolean indicating whether or not to perform confidence interval calculations (defaults to FALSE)

do.mc
: Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Example 10.11 from "Applied Nonparametric Statistical Methods" (5th edition)
cohen.kappa(ch10$dentistA, ch10$dentistB, do.asymp = TRUE, do.exact = FALSE,
  alternative = "greater")

# Example 10.12 from "Applied Nonparametric Statistical Methods" (5th edition)
cohen.kappa(ch10$questionnaire, ch10$demonstration, ch10$items)
```

---

conover *Perform Conover test using standard or squared ranks*

Description

conover() performs the Conover test using standard or squared ranks and is used in chapters 6 and 7 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
conover(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  abs.ranks = FALSE,
  max.exact.perms = 5e+06,
  nsims.mc = 10000,
  seed = NULL,
```

```
  do.asymp = FALSE,
  do.exact = TRUE,
  do.mc = FALSE
)
```

Arguments

x	Numeric vector of same length as y
y	Factor of same length as x
H0	Null hypothesis value (defaults to NULL)
alternative	Type of alternative hypothesis (defaults to two.sided)
abs.ranks	Boolean indicating whether absolute ranks to be used instead of squared ranks (defaults to FALSE)
max.exact.perms	Maximum number of permutations allowed for exact calculations (defaults to 5000000)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 10000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 6.13 from "Applied Nonparametric Statistical Methods" (5th edition)
conover(ch6$typeA, ch6$typeB, do.exact = FALSE, do.asymp = TRUE)

# Exercise 7.15 from "Applied Nonparametric Statistical Methods" (5th edition)
conover(ch7$braking.distance.2, ch7$initial.speed, do.exact = FALSE, do.asymp = TRUE)
```

`control.median` *Perform Control median test*

Description

`control.median()` performs the Control median test and is used in chapters 6 and 9 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
control.median(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.cases = 1000,
  nsims.mc = 10000,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = TRUE
)
```

Arguments

`x`	Numeric vector
`y`	Numeric vector
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`CI.width`	Confidence interval width (defaults to `0.95`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `1000`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `10000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.CI`	Boolean indicating whether or not to perform confidence interval calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 6.9 from "Applied Nonparametric Statistical Methods" (5th edition)
control.median(ch6$sampleI, ch6$sampleII, alternative = "greater")

# Exercise 9.8 from "Applied Nonparametric Statistical Methods" (5th edition)
control.median(ch9$bulbA, ch9$bulbB, alternative = "greater", nsims = 1000)
```

`cox.stuart` *Perform Cox-Stuart test*

Description

`cox.stuart()` performs the Cox-Stuart test and is used in chapters 4 and 10 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
cox.stuart(
  x,
  alternative = c("two.sided", "less", "greater"),
  cont.corr = TRUE,
  max.exact.cases = 1e+07,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`x`	Numeric vector
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`cont.corr`	Boolean indicating whether or not to use continuity correction (defaults to `TRUE`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10000000`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 4.13 from "Applied Nonparametric Statistical Methods" (5th edition)
cox.stuart(ch4$precipitation)

# Exercise 10.5 from "Applied Nonparametric Statistical Methods" (5th edition)
cox.stuart(app1$McDelta[order(ch10$death.year)], alternative = "less")
```

---

cramer.von.mises *Perform Cramer-von Mises test*

Description

`cramer.von.mises()` performs the Cramer-von Mises test and is used in chapter 6 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
cramer.von.mises(x, y, alternative = c("two.sided", "less", "greater"))
```

Arguments

`x`	Numeric vector
`y`	Numeric vector
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 6.16 from "Applied Nonparametric Statistical Methods" (5th edition)
cramer.von.mises(ch6$salivaF, ch6$salivaM)
cramer.von.mises(ch6$salivaF, ch6$salivaM, alternative = "greater")
```

`fishertest.ANSM` *Perform Fisher exact test*

Description

`fishertest.ANSM()` is a wrapper for fisher.test() from the `stats` package - performs the Fisher exact test and is used in chapters 6, 12 and 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
fishertest.ANSM(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 10000,
  do.exact = TRUE
)
```

Arguments

`x`	Numeric vector or factor
`y`	Numeric vector or factor
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10000`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 6.7 from "Applied Nonparametric Statistical Methods" (5th edition)
fishertest.ANSM(ch6$males, ch6$females)

# Exercise 13.10 from "Applied Nonparametric Statistical Methods" (5th edition)
fishertest.ANSM(ch13$laid.off, ch13$employee.ages)
```

`friedman` *Perform Friedman test*

Description

`friedman()` performs the Friedman test and is used in chapter 7 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
friedman(
  y,
  groups,
  blocks,
  use.Iman.Davenport = FALSE,
  max.exact.perms = 1e+05,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`y`	Numeric vector of same length as groups, blocks
`groups`	Factor of same length as y, blocks with levels such that length(y) == nlevels(groups) * nlevels(blocks)
`blocks`	Factor of same length as y, groups with levels such that length(y) == nlevels(groups) * nlevels(blocks)
`use.Iman.Davenport`	Boolean indicating whether or not to use Iman and Davenport approximation (defaults to `FALSE`)
`max.exact.perms`	Maximum number of permutations allowed for exact calculations (defaults to `100000`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 7.6 from "Applied Nonparametric Statistical Methods" (5th edition)
friedman(ch7$pulse, ch7$time.period, ch7$student, do.exact = FALSE, do.asymp = TRUE)

# Exercise 7.12 from "Applied Nonparametric Statistical Methods" (5th edition)
friedman(ch7$names.recalled, ch7$group, ch7$medical.student, use.Iman.Davenport = TRUE,
  do.exact = FALSE, do.asymp = TRUE)
```

---

friedman.lsd *Perform Least Significant Differences test after the Friedman test*

Description

`friedman.lsd()` performs the Least Significant Differences test after the Friedman test and is used in chapter 8 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
friedman.lsd(y, groups, blocks, ids)
```

Arguments

y	Numeric vector of same length as groups, blocks
groups	Factor of same length as y, blocks with levels such that length(y) == nlevels(groups) * nlevels(blocks)
blocks	Factor of same length as y, groups with levels such that length(y) == nlevels(groups) * nlevels(blocks)
ids	Vector of length 2 with elements both levels of groups

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 8.11 from "Applied Nonparametric Statistical Methods" (5th edition)
friedman.lsd(ch8$prey.preference, ch8$prey, ch8$larva, c("Cyclops", "Anopheles"))

#  from "Applied Nonparametric Statistical Methods" (5th edition)
```

gehan.wilcoxon *Perform Gehan-Wilcoxon test*

Description

gehan.wilcoxon() performs the Gehan-Wilcoxon test and is used in chapter 9 of "Applied Non-parametric Statistical Methods" (5th edition)

Usage

```
gehan.wilcoxon(
  x,
  y,
  x.c,
  y.c,
  alternative = c("two.sided", "less", "greater"),
  max.exact.perms = 1e+05,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

x	Numeric vector of same length as y, x.c, y.c
y	Numeric vector of same length as x, x.c, y.c
x.c	Binary vector of same length as x, y, x.c
y.c	Binary vector of same length as x, y, y.c
alternative	Type of alternative hypothesis (defaults to two.sided)
max.exact.perms	Maximum number of permutations allowed for exact calculations (defaults to 100000)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 100000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 9.1 from "Applied Nonparametric Statistical Methods" (5th edition)
gehan.wilcoxon(ch9$symp.survtime, ch9$asymp.survtime,
  ch9$symp.censor, ch9$asymp.censor, alternative = "less",
  do.exact = FALSE, do.asymp = TRUE)

# Exercise 9.5 from "Applied Nonparametric Statistical Methods" (5th edition)
gehan.wilcoxon(ch9$regimeA.survtime, ch9$regimeB.survtime,
  ch9$regimeA.censor, ch9$regimeB.censor, do.exact = FALSE, do.asymp = TRUE)
```

---

hettmansperger.elmore *Perform Hettmansperger and Elmore interaction test*

Description

hettmansperger.elmore() performs the Hettmansperger and Elmore interaction test and is used in chapter 8 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
hettmansperger.elmore(
  y,
  factor.a,
  factor.b,
  nsims.mc = 1000,
  seed = NULL,
  do.asymp = TRUE,
  do.mc = FALSE,
  median.polish = FALSE
)
```

Arguments

y	Numeric vector of same length as factor.a, factor.b
factor.a	Factor of same length as y, factor.b
factor.b	Factor of same length as y, factor.a
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 1000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to TRUE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)
median.polish	Boolean indicating whether or not to use median polish (defaults to FALSE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 8.6 from "Applied Nonparametric Statistical Methods" (5th edition)
hettmansperger.elmore(ch8$plant.weight.2, ch8$growth.hormone, ch8$undersoil.heating)

# Exercise 8.3 from "Applied Nonparametric Statistical Methods" (5th edition)
hettmansperger.elmore(ch8$game.time, ch8$experience, ch8$game)
```

---

hodges.ajne *Perform Hodges-Ajne test*

Description

`hodges.ajne()` performs the Hodges-Ajne test and is used in chapter 4 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
hodges.ajne(x, alternative = c("two.sided"), minx = 0, maxx = 360)
```

Arguments

`x`	Numeric vector
`alternative`	Type of alternative hypothesis (defaults to `c("two.sided")`)
`minx`	Minimum value for x (defaults to `0`)
`maxx`	Maximum value for x (defaults to `360`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 4.16 from "Applied Nonparametric Statistical Methods" (5th edition)
hodges.ajne(ch4$times.as.degrees)

# Exercise 4.14 from "Applied Nonparametric Statistical Methods" (5th edition)
hodges.ajne(ch4$board.angles)
```

`jonckheere.terpstra` *Perform Jonckheere-Terpstra test*

Description

`jonckheere.terpstra()` performs the Jonckheere-Terpstra test and is used in chapters 7, 8 and 12 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
jonckheere.terpstra(
  x,
  g,
  alternative = c("less", "greater"),
  max.exact.cases = 15,
  nsims.mc = 10000,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.mc = FALSE,
  do.asymp.ties.adjust = TRUE
)
```

Arguments

`x`	Numeric vector or factor of same length as g
`g`	Factor of same length as x
`alternative`	Type of alternative hypothesis (defaults to `c("less","greater")`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `15`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `10000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)
`do.asymp.ties.adjust`	Boolean indicating whether or not to use adjustment for ties in data (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 7.3 from "Applied Nonparametric Statistical Methods" (5th edition)
jonckheere.terpstra(ch7$dementia.age, ch7$features, alternative = "greater",
  do.exact = FALSE, do.asymp = TRUE, do.asymp.ties.adjust = FALSE)

# Exercise 12.6 from "Applied Nonparametric Statistical Methods" (5th edition)
jonckheere.terpstra(ch12$ethnic.group, ch12$diabetes.status, do.exact = FALSE, do.asymp = TRUE)
```

---

kendall.concordance *Calculate Kendall's concordance*

Description

`kendall.concordance()` calculates Kendall's concordance and is used in chapter 10 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
kendall.concordance(
  y,
  groups,
  blocks,
  max.exact.perms = 1e+05,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`y`	Numeric vector of same length as groups, blocks
`groups`	Factor of same length as y, blocks with levels such that length(y) == nlevels(groups) * nlevels(blocks)
`blocks`	Factor of same length as y, groups with levels such that length(y) == nlevels(groups) * nlevels(blocks)
`max.exact.perms`	Maximum number of permutations allowed for exact calculations (defaults to `100000`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `10000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Exercise 10.11 from "Applied Nonparametric Statistical Methods" (5th edition)
kendall.concordance(ch10$marks, ch10$script, ch10$examiner, do.exact = FALSE, do.asymp = TRUE)
kendall.concordance(ch10$marks, ch10$examiner, ch10$script, do.exact = FALSE, do.asymp = TRUE)
```

---

kendall.tau *Perform Kendall's tau*

Description

`kendall.tau()` performs the Kendall's tau and is used in chapter 10 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
kendall.tau(
  x,
  y,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.mc = FALSE
)
```

Arguments

`x`	Numeric vector of same length as y
`y`	Numeric vector of same length as x
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Example 10.8 from "Applied Nonparametric Statistical Methods" (5th edition)
kendall.tau(ch10$death.year, app1$McDelta, alternative = "greater",
  do.asymp = TRUE, do.exact = FALSE)

# Example 10.9 from "Applied Nonparametric Statistical Methods" (5th edition)
kendall.tau(ch10$Canadian, ch10$Australian)
```

---

kruskal.wallis *Perform Kruskal-Wallis test*

Description

`kruskal.wallis()` performs the Kruskal-Wallis test and is used in chapters 7 and 12 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
kruskal.wallis(
  x,
  g,
  max.exact.cases = 15,
  nsims.mc = 10000,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.mc = FALSE
)
```

Arguments

`x`	Numeric vector or factor of same length as g
`g`	Factor of same length as x
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `15`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `10000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 7.1 from "Applied Nonparametric Statistical Methods" (5th edition)
kruskal.wallis(ch7$affordability, ch7$regions, do.exact = FALSE, do.asymp = TRUE)

# Exercise 7.16 from "Applied Nonparametric Statistical Methods" (5th edition)
kruskal.wallis(ch7$affordability, ch7$regions)
```

---

kruskal.wallis.lsd *Perform Least Significant Differences test after the Kruskal-Wallis test*

Description

`kruskal.wallis.lsd()` performs the Least Significant Differences test after the Kruskal-Wallis test and is used in chapter 8 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
kruskal.wallis.lsd(x, g, ids)
```

Arguments

`x`	Numeric vector of same length as g
`g`	Factor of same length as x
`ids`	Vector of length 2 with elements both levels of g

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 8.10 from "Applied Nonparametric Statistical Methods" (5th edition)
kruskal.wallis.lsd(ch8$sentences, ch8$authors, c("Vulliamy", "Queen"))

# Exercise 8.8 from "Applied Nonparametric Statistical Methods" (5th edition)
kruskal.wallis.lsd(ch8$seizure.score, ch8$hospital, c("HospitalA", "HospitalC"))
```

`kruskal.wallis.vdW` *Perform Kruskal-Wallis test with van der Waerden scores*

Description

`kruskal.wallis.vdW()` performs the Kruskal-Wallis test with van der Waerden scores and is used in chapter 7 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
kruskal.wallis.vdW(
  x,
  g,
  max.exact.cases = 15,
  nsims.mc = 10000,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`x`	Numeric vector of same length as g
`g`	Factor of same length as x
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `15`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `10000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 7.2 from "Applied Nonparametric Statistical Methods" (5th edition)
kruskal.wallis.vdW(ch7$age, ch7$positions)
kruskal.wallis.vdW(ch7$age, ch7$positions, do.exact = FALSE, do.asymp = TRUE)
```

`kstest.ANSM` *Perform Smirnov test and Kolgomorov test*

Description

`kstest.ANSM()` is a wrapper for ks.test() from the `stats` package - performs the Smirnov test and Kolgomorov test and is used in chapters 4, 6 and 9 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
kstest.ANSM(
  x,
  y,
  ...,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 1000,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`x`	Numeric vector
`y`	Numeric vector or a character string naming a cumulative distribution function or an actual cumulative distribution function
`...`	For the default method of `ks.test`, parameters of the distribution specified (as a character string) by y. Otherwise, further arguments to be passed to or from methods
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `1000`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Exercise 4.3 from "Applied Nonparametric Statistical Methods" (5th edition)
kstest.ANSM(ch4$visiting.supporters, "pexp", rate = 2600)

# Exercise 9.2 from "Applied Nonparametric Statistical Methods" (5th edition)
kstest.ANSM(ch9$boys.toothtime, ch9$girls.toothtime)
```

---

lik.ratio *Perform Likelihood ratio test*

Description

`lik.ratio()` performs the Likelihood ratio test and is used in chapters 12 and 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
lik.ratio(
  x,
  y,
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.exact = TRUE,
  do.asymp = FALSE,
  do.mc = FALSE
)
```

Arguments

`x`	Factor of same length as y
`y`	Factor of same length as x
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 12.2 from "Applied Nonparametric Statistical Methods" (5th edition)
lik.ratio(ch12$infection.site, ch12$district, do.exact = FALSE, do.asymp = TRUE)

# Example 13.12 from "Applied Nonparametric Statistical Methods" (5th edition)
chemo.side.effect.3 <- ch13$chemo.side.effect
levels(chemo.side.effect.3) <- list("Side-effect" = c("Hair loss",
  "Visual impairment", "Hair loss & Visual impairment"), "None" = "None")
lik.ratio(ch13$chemo.drug, chemo.side.effect.3, seed = 1)
```

---

lilliefors *Performs Lilliefors test of Normality*

Description

`lilliefors()` performs Lilliefors test of Normality and is used in chapters 4, 5 and 6 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
lilliefors(x, alternative = c("two.sided"), nsims.mc = 10000, seed = NULL)
```

Arguments

`x`	Numeric vector
`alternative`	Type of alternative hypothesis (defaults to `c("two.sided")`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `10000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 4.4 from "Applied Nonparametric Statistical Methods" (5th edition)
lilliefors(ch4$ages, seed = 1)

# Exercise 6.15 from "Applied Nonparametric Statistical Methods" (5th edition)
lilliefors(ch6$doseI.2, seed = 1, nsims = 1000)
```

`linear.by.linear` *Perform Linear by linear association test*

Description

`linear.by.linear()` performs the Linear by linear association test and is used in chapter 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
linear.by.linear(
  x,
  y,
  u = NULL,
  v = NULL,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.mc = TRUE
)
```

Arguments

x	Factor of same length as y
y	Factor of same length as x
u	Numeric vector of length equal to number of levels of x or NULL (defaults to NULL)
v	Numeric vector of length equal to number of levels of y or NULL (defaults to NULL)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 100000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to TRUE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 13.8 from "Applied Nonparametric Statistical Methods" (5th edition)
linear.by.linear(ch13$dose, ch13$dose.side.effect, do.mc = FALSE, do.asymp = TRUE)
```

```
# Exercise 13.4 from "Applied Nonparametric Statistical Methods" (5th edition)
linear.by.linear(ch13$SBP, ch13$cholesterol, seed = 1)
```

`logoddsratio.2x2` *Perform Log odds ratio test*

Description

`logoddsratio.2x2()` performs the Log odds ratio test and is used in chapter 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
logoddsratio.2x2(
  x,
  y,
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.exact = TRUE,
  do.asymp = FALSE,
  do.mc = FALSE
)
```

Arguments

`x`	Binary factor of same length as y
`y`	Binary factor of same length as x
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Exercise 13.2 from "Applied Nonparametric Statistical Methods" (5th edition)
#logoddsratio.2x2(ch13$physical.activity[ch13$gender == "Boy"],
#  ch13$tv.viewing[ch13$gender == "Boy"], do.exact = FALSE, do.asymp = TRUE)
#logoddsratio.2x2(ch13$physical.activity[ch13$gender == "Girl"],
#  ch13$tv.viewing[ch13$gender == "Girl"], do.exact = FALSE, do.asymp = TRUE)
```

---

logrank *Perform logrank test*

Description

`logrank()` performs the logrank test and is used in chapter 9 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
logrank(
  x,
  censored,
  groups,
  score.censored = TRUE,
  max.exact.perms = 1e+05,
  nsims.mc = 10000,
  seed = NULL
)
```

Arguments

`x`	Numeric vector of same length as censored, groups
`censored`	Binary vector of same length as x, groups
`groups`	Factor of same length as x, censored
`score.censored`	Boolean indicating whether or not to score censored values (defaults to `TRUE`)
`max.exact.perms`	Maximum number of permutations allowed for exact calculations (defaults to `100000`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `10000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 9.6 from "Applied Nonparametric Statistical Methods" (5th edition)
logrank(ch9$samplesAB.survtime, ch9$samplesAB.censor, ch9$samplesAB, score.censored = FALSE)

# Exercise 9.7 from "Applied Nonparametric Statistical Methods" (5th edition)
logrank(ch9$samplesXYZ.survtime, ch9$samplesXYZ.censor, ch9$samplesXYZ)
```

---

mantel.haenszel *Perform Mantel-Haenszel test*

Description

`mantel.haenszel()` performs the Mantel-Haenszel test and is used in chapter 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
mantel.haenszel(x, y, z, do.asymp = TRUE)
```

Arguments

x	Binary factor of same length as y, z
y	Binary factor of same length as x, z
z	Factor of same length as x, y
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to TRUE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 13.4 from "Applied Nonparametric Statistical Methods" (5th edition)
mantel.haenszel(ch13$drug, ch13$side.effects, ch13$age.group)

#  from "Applied Nonparametric Statistical Methods" (5th edition)
```

`med.test` *Perform Median test*

Description

`med.test()` performs the Median test and is used in chapters 6 and 7 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
med.test(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.cases = 1000,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = TRUE
)
```

Arguments

`x`	Numeric vector of same length as y
`y`	Numeric vector, or factor of same length as x
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`CI.width`	Confidence interval width (defaults to `0.95`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `1000`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.CI`	Boolean indicating whether or not to perform confidence interval calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 6.7 from "Applied Nonparametric Statistical Methods" (5th edition)
med.test(ch6$males, ch6$females)

# Example 7.5 from "Applied Nonparametric Statistical Methods" (5th edition)
med.test(ch7$time, ch7$surgeon, do.exact = FALSE, do.asymp = TRUE)
```

---

mood *Perform Mood test*

Description

`mood()` performs the Mood test and is used in chapter 6 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
mood(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 25,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`x`	Numeric vector
`y`	Numeric vector
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `25`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 6.12 from "Applied Nonparametric Statistical Methods" (5th edition)
mood(ch6$typeA, ch6$typeB)
mood(ch6$typeA, ch6$typeB, do.exact = FALSE, do.asymp = TRUE)
```

`moses.extreme.reactions`

Perform Moses test for extreme reactions

Description

`moses.extreme.reactions()` performs the Moses test for extreme reactions and is used in chapter 6 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
moses.extreme.reactions(
  x,
  y,
  H0 = NULL,
  max.exact.cases = 1000,
  do.exact = TRUE
)
```

Arguments

`x`	Numeric vector
`y`	Numeric vector
`H0`	Null hypothesis value (defaults to `NULL`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `1000`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 6.14 from "Applied Nonparametric Statistical Methods" (5th edition)
moses.extreme.reactions(ch6$groupI.amended, ch6$groupII)
moses.extreme.reactions(ch6$groupI.amended, ch6$groupII)
```

noether *Calculate Noether approximation*

Description

noether() calculates the Noether approximation and is used in chapter 5 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
noether(p1, alpha = 0.05, power = 0.9)
```

Arguments

p1	Probability (expressed as a number between 0 and 1)
alpha	Level of significance (expressed as number between 0 and 1) (defaults to 0.05)
power	Power (expressed as number between 0 and 1) (defaults to 0.9)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Exercise 5.8 from "Applied Nonparametric Statistical Methods" (5th edition)
noether(p1 = 0.7534, alpha = 0.05, power = 0.9)

# Exercise 5.16 from "Applied Nonparametric Statistical Methods" (5th edition)
noether(p1 = 0.8, alpha = 0.025, power = 0.9)
```

normal.scores.test *Perform Normal Scores test*

Description

normal.scores.test() performs the Normal Scores test and is used in chapters 6 and 8 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
normal.scores.test(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 25,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

x	Numeric vector
y	Numeric vector
H0	Null hypothesis value (defaults to NULL)
alternative	Type of alternative hypothesis (defaults to two.sided)
max.exact.cases	Maximum number of cases allowed for exact calculations (defaults to 25)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 5.8 from "Applied Nonparametric Statistical Methods" (5th edition)
normal.scores.test(ch6$groupA, ch6$groupB, do.exact = FALSE, do.asymp = TRUE)

# Exercise 6.15 from "Applied Nonparametric Statistical Methods" (5th edition)
normal.scores.test(ch6$doseI, ch6$doseII)
```

---

oddsratio.2x2diff *Perform test for difference in odds ratios*

Description

oddsratio.2x2diff() performs the test for difference in odds ratios and is used in chapter 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
oddsratio.2x2diff(
  x,
  y,
  z,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.perms = 1e+06,
  nsims.mc = 1e+05,
  seed = NULL,
  do.exact = TRUE,
  do.asymp = FALSE,
  do.mc = FALSE,
  do.CI = TRUE
)
```

Arguments

x	Binary factor of same length as y, z
y	Binary factor of same length as x, z
z	Binary factor of same length as x, y
alternative	Type of alternative hypothesis (defaults to two.sided)
CI.width	Confidence interval width (defaults to 0.95)
max.exact.perms	Maximum number of permutations allowed for exact calculations (defaults to 1000000)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 100000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)
do.CI	Boolean indicating whether or not to perform confidence interval calculations (defaults to TRUE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 13.2 from "Applied Nonparametric Statistical Methods" (5th edition)
oddsratio.2x2diff(ch13$physical.activity, ch13$tv.viewing, ch13$gender,
  do.exact = FALSE, do.asymp = TRUE)
```

```
oddsratio.2x2diff(ch13$physical.activity, ch13$tv.viewing, ch13$gender,
  do.exact = FALSE, do.mc = TRUE, seed = 1, nsims = 10000)
```

---

pearson *Calculate Pearson correlation*

Description

pearson() calculates the Pearson correlation and is used in chapters 10 and 11 of "Applied Non-parametric Statistical Methods" (5th edition)

Usage

```
pearson(
  x,
  y,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.mc = FALSE
)
```

Arguments

x	Numeric vector of same length as y
y	Numeric vector of same length as x
alternative	Type of alternative hypothesis (defaults to two.sided)
max.exact.cases	Maximum number of cases allowed for exact calculations (defaults to 10)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 100000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Section 10.1.2 from "Applied Nonparametric Statistical Methods" (5th edition)
pearson(ch10$q1, ch10$q2, alternative = "greater", do.asymp = TRUE, do.exact = FALSE)

# Example 11.2 from "Applied Nonparametric Statistical Methods" (5th edition)
pearson(ch11$parentlimit, ch11$reportedtime - 1 * ch11$parentlimit, alternative = "two.sided")
```

`pearson.beta` *Calculate Pearson beta*

Description

`pearson.beta()` calculates the Pearson beta and is used in chapter 11 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
pearson.beta(
  y,
  x,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = FALSE,
  do.mc = FALSE
)
```

Arguments

`y`	Numeric vector of same length as x
`x`	Numeric vector of same length as y
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`CI.width`	Confidence interval width (defaults to `0.95`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)

do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)
do.CI	Boolean indicating whether or not to perform confidence interval calculations (defaults to FALSE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Example 11.2 from "Applied Nonparametric Statistical Methods" (5th edition)
pearson.beta(ch11$reportedtime, ch11$parentlimit, H0 = 1)
pearson.beta(ch11$reportedtime[1:6], ch11$parentlimit[1:6], H0 = 1)
```

---

peto.wilcoxon *Perform Peto-Wilcoxon test*

Description

peto.wilcoxon() performs the Peto-Wilcoxon test and is used in chapter 9 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
peto.wilcoxon(
  x,
  y,
  x.c,
  y.c,
  alternative = c("two.sided", "less", "greater"),
  max.exact.perms = 1e+05,
  nsims.mc = 10000,
  seed = NULL
)
```

Arguments

x	Numeric vector of same length as y, x.c, y.c
y	Numeric vector of same length as x, x.c, y.c
x.c	Binary vector of same length as x, y, x.c

y.c	Binary vector of same length as x, y, y.c
alternative	Type of alternative hypothesis (defaults to two.sided)
max.exact.perms	Maximum number of permutations allowed for exact calculations (defaults to 100000)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 10000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 9.4 from "Applied Nonparametric Statistical Methods" (5th edition)
peto.wilcoxon(ch9$sampleI.survtime, ch9$sampleII.survtime,
  ch9$sampleI.censor, ch9$sampleII.censor, alternative = "less")
```

---

pitman *Perform Pitman test*

Description

pitman() performs the Pitman test and is used in chapter 3 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
pitman(
  x,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.cases = 1000,
  nsims.mc = 10000,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = TRUE
)
```

Arguments

x	Numeric vector
H0	Null hypothesis value (defaults to NULL)
alternative	Type of alternative hypothesis (defaults to two.sided)
CI.width	Confidence interval width (defaults to 0.95)
max.exact.cases	Maximum number of cases allowed for exact calculations (defaults to 1000)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 10000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)
do.CI	Boolean indicating whether or not to perform confidence interval calculations (defaults to TRUE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 3.11 from "Applied Nonparametric Statistical Methods" (5th edition)
pitman(ch3$heartrates1, 70, "greater", do.exact = FALSE, do.asymp = TRUE)

# Exercise 3.17 from "Applied Nonparametric Statistical Methods" (5th edition)
pitman(ch3$sampleII, 110, do.exact = FALSE, do.asymp = TRUE)
```

---

print.ANSMstat *Prints an ANSMstat object*

Description

print.ANSMstat() prints the output contained in an ANSMstat object

Usage

```
## S3 method for class 'ANSMstat'
print(x, ...)
```

Arguments

x	An ANSMstat object
...	Further arguments relevant to the default print function

Value

No return value, called to display results

`print.ANSMtest` *Prints an ANSMtest object*

Description

`print.ANSMtest()` prints the output contained in an ANSMtest object

Usage

```
## S3 method for class 'ANSMtest'
print(x, ...)
```

Arguments

`x`	An ANSMtest object
`...`	Further arguments relevant to the default `print` function

Value

No return value, called to display results

`rng.test` *Perform Range test*

Description

`rng.test()` performs the Range test and is used in chapter 4 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
rng.test(x, alternative = c("two.sided"), minx = 0, maxx = 360)
```

Arguments

`x`	Numeric vector
`alternative`	Type of alternative hypothesis (defaults to `c("two.sided")`)
`minx`	Minimum value for x (defaults to `0`)
`maxx`	Maximum value for x (defaults to `360`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 4.17 from "Applied Nonparametric Statistical Methods" (5th edition)
rng.test(ch4$dates.as.degrees)

# Exercise 4.13 from "Applied Nonparametric Statistical Methods" (5th edition)
rng.test(ch4$accident.bearings)
```

---

runs.2cat *Perform Runs test for two categories*

Description

`runs.2cat()` performs the Runs test for two categories and is used in chapters 4, 5 and 6 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
runs.2cat(
  x,
  alternative = c("two.sided", "less", "greater"),
  cont.corr = TRUE,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`x`	Vector with two unique values
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`cont.corr`	Boolean indicating whether or not to use continuity correction (defaults to `TRUE`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 4.14 from "Applied Nonparametric Statistical Methods" (5th edition)
runs.2cat(ch4$tosses1, do.exact = FALSE, do.asymp = TRUE)

# Exercise 6.17 from "Applied Nonparametric Statistical Methods" (5th edition)
runs.2cat(ch6$twins, alternative = "greater")
```

`runs.ncat` *Perform Runs test for three or more categories*

Description

`runs.ncat()` performs the Runs test for three or more categories and is used in chapters 4 and 7 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
runs.ncat(
  x,
  alternative = c("two.sided", "less", "greater"),
  cont.corr = TRUE,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = TRUE,
  do.mc = FALSE
)
```

Arguments

`x`	Vector or factor
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`cont.corr`	Boolean indicating whether or not to use continuity correction (defaults to `TRUE`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `TRUE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 4.15 from "Applied Nonparametric Statistical Methods" (5th edition)
runs.ncat(ch4$births, alternative = "less")

# Exercise 7.16 from "Applied Nonparametric Statistical Methods" (5th edition)
runs.ncat(ch7$regions[order(ch7$affordability)], alternative = "less")
```

---

sgn.test *Perform Sign test*

Description

`sgn.test()` performs the Sign test and is used in chapters 3, 4, 5 and 6 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
sgn.test(
  x,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  cont.corr = TRUE,
  CI.width = 0.95,
  max.exact.cases = 1e+06,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = TRUE
)
```

Arguments

`x`	Numeric vector, or binary factor and H0 is NULL
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`cont.corr`	Boolean indicating whether or not to use continuity correction (defaults to `TRUE`)
`CI.width`	Confidence interval width (defaults to `0.95`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `1000000`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.CI`	Boolean indicating whether or not to perform confidence interval calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 3.1 from "Applied Nonparametric Statistical Methods" (5th edition)
sgn.test(ch3$sampleI, 110)

# Exercise 6.2 from "Applied Nonparametric Statistical Methods" (5th edition)
sgn.test(ch5$LVF - ch5$RVF, 0)
```

---

shapirotest.ANSM *Perform Shapiro-Wilk test of Normality*

Description

`shapirotest.ANSM()` is a wrapper for shapiro.test() from the `stats` package - performs the Shapiro-Wilk test of Normality and is used in chapters 4 and 5 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
shapirotest.ANSM(x, alternative = c("two.sided"))
```

Arguments

`x`	Numeric vector
`alternative`	Type of alternative hypothesis (defaults to `c("two.sided")`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 4.4 from "Applied Nonparametric Statistical Methods" (5th edition)
shapirotest.ANSM(ch4$ages)

# Example 5.3 from "Applied Nonparametric Statistical Methods" (5th edition)
shapirotest.ANSM(ch5$bp.incorrect)
```

`siegel.tukey` *Perform Siegel-Tukey test*

Description

`siegel.tukey()` performs the Siegel-Tukey test using mean or median shift and is used in chapter 6 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
siegel.tukey(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  mean.shift = FALSE,
  cont.corr = TRUE,
  max.exact.cases = 1000,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE
)
```

Arguments

`x`	Numeric vector
`y`	Numeric vector
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`mean.shift`	Boolean indicating whether mean shift to be used instead of median shift (defaults to `FALSE`)
`cont.corr`	Boolean indicating whether or not to use continuity correction (defaults to `TRUE`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `1000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Exercise 6.11 from "Applied Nonparametric Statistical Methods" (5th edition)
siegel.tukey(ch6$typeA, ch6$typeB, mean.shift = TRUE)

# Exercise 6.16 from "Applied Nonparametric Statistical Methods" (5th edition)
siegel.tukey(ch6$travel, ch6$politics)
```

`spearman` *Calculate Spearman correlation*

Description

`spearman()` calculates the Spearman correlation and is used in chapter 10 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
spearman(
  x,
  y,
  alternative = c("two.sided", "less", "greater"),
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.mc = FALSE
)
```

Arguments

`x`	Numeric vector of same length as y
`y`	Numeric vector of same length as x
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10`)
`nsims.mc`	Number of Monte Carlo simulations to be performed (defaults to `100000`)
`seed`	Random number seed to be used for Monte Carlo simulations (defaults to `NULL`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.mc`	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to `FALSE`)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Example 10.2 from "Applied Nonparametric Statistical Methods" (5th edition)
spearman(ch10$q1, ch10$q2, alternative = "greater", do.asymp = TRUE, do.exact = FALSE)

# Exercise 10.1 from "Applied Nonparametric Statistical Methods" (5th edition)
spearman(ch10$ERA, ch10$ESMS, do.exact = FALSE)
```

---

spearman.beta *Calculate Spearman beta*

Description

`spearman.beta()` calculates the Spearman beta and is used in chapter 11 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
spearman.beta(
  y,
  x,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = FALSE,
  do.mc = FALSE
)
```

Arguments

`y`	Numeric vector of same length as x
`x`	Numeric vector of same length as y
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`CI.width`	Confidence interval width (defaults to `0.95`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `10`)

nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 100000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)
do.CI	Boolean indicating whether or not to perform confidence interval calculations (defaults to FALSE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Example 11.3 from "Applied Nonparametric Statistical Methods" (5th edition)
spearman.beta(ch11$reportedtime, ch11$parentlimit, H0 = 1)
spearman.beta(ch11$reportedtime, ch11$parentlimit, H0 = 1, do.CI = TRUE)
```

---

theil.kendall *Calculate Theil-Kendall beta*

Description

theil.kendall() calculates the Theil-Kendall beta and is used in chapter 11 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
theil.kendall(
  y,
  x,
  H0 = NULL,
  do.abbreviated = FALSE,
  do.alpha = FALSE,
  alternative = c("two.sided", "less", "greater"),
  CI.width = 0.95,
  max.exact.cases = 10,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = FALSE,
  do.mc = FALSE
)
```

Arguments

y	Numeric vector of same length as x
x	Numeric vector of same length as y
H0	Null hypothesis value (defaults to NULL)
do.abbreviated	Boolean indicating whether or not to use abbreviated Theil procedure (defaults to FALSE)
do.alpha	Boolean indicating whether or not to report estimate of alpha (defaults to FALSE)
alternative	Type of alternative hypothesis (defaults to two.sided)
CI.width	Confidence interval width (defaults to 0.95)
max.exact.cases	Maximum number of cases allowed for exact calculations (defaults to 10)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 100000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)
do.CI	Boolean indicating whether or not to perform confidence interval calculations (defaults to FALSE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)

Value

An ANSMstat object with the results from applying the function

Examples

```
# Example 11.6 from "Applied Nonparametric Statistical Methods" (5th edition)
theil.kendall(ch11$reportedtime, ch11$parentlimit, do.alpha = TRUE)

# Exercise 11.10 from "Applied Nonparametric Statistical Methods" (5th edition)
theil.kendall(ch11$N.Scotland, ch11$SW.England)
```

---

wilcoxon.mann.whitney *Perform Wilcoxon-Mann-Whitney test*

Description

wilcoxon.mann.whitney() performs the Wilcoxon-Mann-Whitney test and is used in chapters 6, 8, 9 and 12 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
wilcoxon.mann.whitney(
  x,
  y,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  cont.corr = TRUE,
  CI.width = 0.95,
  max.exact.cases = 1000,
  nsims.mc = 1e+05,
  seed = NULL,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.mc = FALSE,
  do.CI = TRUE
)
```

Arguments

x	Numeric vector, or factor with same levels as y
y	Numeric vector, or factor with same levels as x
H0	Null hypothesis value (defaults to NULL)
alternative	Type of alternative hypothesis (defaults to two.sided)
cont.corr	Boolean indicating whether or not to use continuity correction (defaults to TRUE)
CI.width	Confidence interval width (defaults to 0.95)
max.exact.cases	Maximum number of cases allowed for exact calculations (defaults to 1000)
nsims.mc	Number of Monte Carlo simulations to be performed (defaults to 100000)
seed	Random number seed to be used for Monte Carlo simulations (defaults to NULL)
do.asymp	Boolean indicating whether or not to perform asymptotic calculations (defaults to FALSE)
do.exact	Boolean indicating whether or not to perform exact calculations (defaults to TRUE)
do.mc	Boolean indicating whether or not to perform Monte Carlo calculations (defaults to FALSE)
do.CI	Boolean indicating whether or not to perform confidence interval calculations (defaults to TRUE)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Examples 6.1 and 6.2 from "Applied Nonparametric Statistical Methods" (5th edition)
wilcoxon.mann.whitney(ch6$groupA, ch6$groupB)

# Exercise 12.4 from "Applied Nonparametric Statistical Methods" (5th edition)
wilcoxon.mann.whitney(ch12$feedback.satisfaction[ch12$PPI.person.2 == "Representative"],
  ch12$feedback.satisfaction[ch12$PPI.person.2 == "Researcher"],
  do.exact = FALSE, do.asymp = TRUE)
```

---

wilcoxon.signedrank *Perform Wilcoxon signed-rank test*

Description

`wilcoxon.signedrank()` performs the Wilcoxon signed-rank test and is used in chapters 3, 4 and 5 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
wilcoxon.signedrank(
  x,
  H0 = NULL,
  alternative = c("two.sided", "less", "greater"),
  cont.corr = TRUE,
  CI.width = 0.95,
  max.exact.cases = 1000,
  do.asymp = FALSE,
  do.exact = TRUE,
  do.CI = TRUE
)
```

Arguments

`x`	Numeric vector
`H0`	Null hypothesis value (defaults to `NULL`)
`alternative`	Type of alternative hypothesis (defaults to `two.sided`)
`cont.corr`	Boolean indicating whether or not to use continuity correction (defaults to `TRUE`)
`CI.width`	Confidence interval width (defaults to `0.95`)
`max.exact.cases`	Maximum number of cases allowed for exact calculations (defaults to `1000`)
`do.asymp`	Boolean indicating whether or not to perform asymptotic calculations (defaults to `FALSE`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)
`do.CI`	Boolean indicating whether or not to perform confidence interval calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Example 3.4 from "Applied Nonparametric Statistical Methods" (5th edition)
wilcoxon.signedrank(ch3$heartrates1, 70, "greater")

# Exercise 5.12 from "Applied Nonparametric Statistical Methods" (5th edition)
wilcoxon.signedrank(ch5$kHz0.125 - ch5$kHz0.25, 0)
```

---

zelen *Perform Zelen test*

Description

`zelen()` performs the Zelen test and is used in chapter 13 of "Applied Nonparametric Statistical Methods" (5th edition)

Usage

```
zelen(x, y, z, max.exact.perms = 1e+06, do.exact = TRUE)
```

Arguments

`x`	Binary factor of same length as y, z
`y`	Binary factor of same length as x, z
`z`	Factor of same length as x, y
`max.exact.perms`	Maximum number of permutations allowed for exact calculations (defaults to `1000000`)
`do.exact`	Boolean indicating whether or not to perform exact calculations (defaults to `TRUE`)

Value

An ANSMtest object with the results from applying the function

Examples

```
# Section 13.2.5 from "Applied Nonparametric Statistical Methods" (5th edition)
zelen(ch13$drug, ch13$side.effects, ch13$age.group)

# Example 13.3 from "Applied Nonparametric Statistical Methods" (5th edition)
zelen(ch13$machine, ch13$output.status, ch13$material.source)
```

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