Package ‘uniftest’

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Title Tests for Uniformity

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Description Goodness-of-fit tests for the uniform distribution.

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R topics documented:

`dudewicz.unif.test` *Dudewicz-van der Meulen test for uniformity*

Description

Performs Dudewicz-van der Meulen test for the hypothesis of uniformity.

Usage

```
dudewicz.unif.test(x, nrepl=2000,m=length(x)/2)
```

Arguments

`x`	a numeric vector of data values.
`nrepl`	the number of replications in Monte Carlo simulation.
`m`	a parameter of the test (see below).

Details

The Dudewicz-van der Meulen test for uniformity is based on the following statistic:

$$H(m,n) = -\frac{1}{n}\sum_{i=1}^{n}\log_2\frac{n}{2m}(x_{(i+m)} - x_{(i-m)})$$

The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

`statistic`	the value of the Dudewicz-van der Meulen statistic.
`p.value`	the p-value for the test.
`method`	the character string "Dudewicz-van der Meulen test for uniformity".
`data.name`	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Dudewicz E. J., van der Meulen E. C. (1981): Entropy-based tests of uniformity. — JASA, vol. 76, pp. 967–974.

Examples

```
dudewicz.unif.test(runif(100,0,1))
dudewicz.unif.test(runif(100,0.1,0.9))
```

`frosini.unif.test` *Frosini test for uniformity*

Description

Performs Frosini test for the hypothesis of uniformity, see Frosini (1987).

Usage

```
frosini.unif.test(x, nrepl=2000)
```

Arguments

`x`	a numeric vector of data values.
`nrepl`	the number of replications in Monte Carlo simulation.

Details

The Frosini test for uniformity is based on the following statistic:

$$B_n = \frac{1}{\sqrt{n}} \sum_{i=1}^{n} \left| X_{(i)} - \frac{i - 0.5}{n} \right|.$$

The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

`statistic`	the value of the Frosini statistic.
`p.value`	the p-value for the test.
`method`	the character string "Frosini test for uniformity".
`data.name`	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Frosini, B.V. (1987): On the distribution and power of a goodness-of-fit statistic with parametric and nonparametric applications, "Goodness-of-fit". (Ed. by Revesz P., Sarkadi K., Sen P.K.) — Amsterdam-Oxford-New York: North-Holland. — Pp. 133–154.

Examples

```
frosini.unif.test(runif(100,0,1))
frosini.unif.test(runif(100,0.1,0.9))
```

`hegazy.unif.test` *Hegazy-Green test for uniformity*

Description

Performs Hegazy-Green test for the hypothesis of uniformity.

Usage

```
hegazy.unif.test(x, nrepl=2000, p=1)
```

Arguments

`x`	a numeric vector of data values.
`p`	a parameter of the test (see below).
`nrepl`	the number of replications in Monte Carlo simulation.

Details

The Hegazy-Green test for uniformity is based on the following statistic:

$$T_p = \frac{1}{n}\sum_{i=1}^{n}\left|X_{(i)} - \frac{i}{n+1}\right|^p.$$

The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

`statistic`	the value of the Hegazy-Green statistic.
`p.value`	the p-value for the test.
`method`	the character string "Hegazy-Green test for uniformity".
`data.name`	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Hegazy, Y. A. S. and Green, J. R. (1975): Some new goodness-of-fit tests using order statistics. — Journal of the Royal Statistical Society. Series C (Applied Statistics), vol. 24, pp. 299–308.

Examples

```
hegazy.unif.test(runif(100,0,1))
hegazy.unif.test(runif(100,0.1,0.9))
```

kolmogorov.unif.test *Kolmogorov-Smirnov test for uniformity*

Description

Performs Kolmogorov-Smirnov test for the hypothesis of uniformity, see Kolmogorov (1933).

Usage

```
kolmogorov.unif.test(x, nrepl=2000,k=0)
```

Arguments

x	a numeric vector of data values.
nrepl	the number of replications in Monte Carlo simulation.
k	variant the criterion.

Details

The Kolmogorov-Smirnov test for uniformity is based on the following statistics:

$$D^+ = max_i \left(x_i - \frac{i}{n+1} \right), \quad D^- = max_i \left(\frac{i}{n+1} - x_i \right), \quad D = max(D^+, D^-).$$

The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

statistic	the value of the Kolmogorov-Smirnov statistic.
p.value	the p-value for the test.
method	the character string "Kolmogorov-Smirnov test for uniformity".
data.name	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Kolmogorov A. (1933): Sulla determinazione empirica di una legge di distribuzione. — G. Ist. Ital. Attuari, vol. 4, pp. 83–91.

Examples

```
kolmogorov.unif.test(runif(100,0,1))
kolmogorov.unif.test(runif(100,0.1,0.9))
```

`kuiper.unif.test` *Kuiper test for uniformity*

Description

Performs Kuiper test for the hypothesis of uniformity, see Kuiper (1960).

Usage

```
kuiper.unif.test(x, nrepl=2000)
```

Arguments

`x`	a numeric vector of data values.
`nrepl`	the number of replications in Monte Carlo simulation.

Details

The Kuiper test for uniformity is based on the following statistic:

$$V = \max_i \left(\frac{i}{n} - X_{(i)} \right) + \max_i \left(X_{(i)} - \frac{i-1}{n} \right)$$

The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

`statistic`	the value of the Kuiper statistic.
`p.value`	the p-value for the test.
`method`	the character string "Kuiper test for uniformity".
`data.name`	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Kuiper, N.H. (1960): Tests concerning random points on a circle. — Proc. Kon. Ned. Akad. Wetensch., Ser. A, vol. 63, pp. 38–47.

Examples

```
kuiper.unif.test(runif(100,0,1))
kuiper.unif.test(rbeta(100,0.5,0.5))
```

`neyman.unif.test` *Neyman-Barton test for uniformity*

Description

Performs Neyman-Barton test for the hypothesis of uniformity.

Usage

```
neyman.unif.test(x, nrepl=2000, k=5)
```

Arguments

`x`	a numeric vector of data values.
`nrepl`	the number of replications in Monte Carlo simulation.
`k`	the number of Legendre polynomials.

Details

The Neyman-Barton test for uniformity is based on the following statistic:

$$N_k = \sum_{j=1}^{k} \left(\frac{1}{\sqrt{n}} \sum_{i=1}^{n} \pi_j(x_i) \right)^2,$$

where $\pi_j(x_i)$ are Legendre polynomials orthogonal on the interval [0,1].

The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

`statistic`	the value of the Neyman-Barton statistic.
`p.value`	the p-value for the test.
`method`	the character string "Neyman-Barton test for uniformity".
`data.name`	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Neyman J. "Smooth" test for goodness-of-fit // Scand. Aktuarietidsrift. 1937. V. 20. P. 149-199.

Examples

```
neyman.unif.test(runif(100,0,1))
neyman.unif.test(runif(100,0.1,0.9))
```

`quesenberry.unif.test` *Quesenberry–Miller test for uniformity*

Description

Performs Quesenberry–Miller test for the hypothesis of uniformity, see Quesenberry and Miller (1977).

Usage

```
quesenberry.unif.test(x, nrepl=2000)
```

Arguments

`x`	a numeric vector of data values.
`nrepl`	the number of replications in Monte Carlo simulation.

Details

The Quesenberry–Miller test for uniformity is based on the following statistic:

$$B_n = \sum_{i=1}^{n+1} \left(X_{(i)} - X_{(i-1)}\right)^2 + \sum_{i=1}^{n} \left(X_{(i)} - X_{(i-1)}\right) \left(X_{(i+1)} - X_{(i)}\right),$$

where $X_{(0)} = 0$, $X_{(n+1)} = 1$. The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

`statistic`	the value of the Quesenberry–Miller statistic.
`p.value`	the p-value for the test.
`method`	the character string "Quesenberry–Miller test for uniformity".
`data.name`	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Quesenberry, C.P. and Miller F.L. (1977): Power studies of some tests for uniformity. — J. Stat. Comput. Simul., vol. 5, pp. 169–191.

Examples

```
quesenberry.unif.test(runif(100,0,1))
quesenberry.unif.test(runif(100,0,1.05))
```

`sarkadi.unif.test` *Sarkadi-Kosik test for uniformity*

Description

Performs Sarkadi-Kosik test for the hypothesis of uniformity.

Usage

```
sarkadi.unif.test(x, nrepl=2000)
```

Arguments

`x`	a numeric vector of data values.
`nrepl`	the number of replications in Monte Carlo simulation.

Details

The Sarkadi-Kosik test for uniformity is based on the following statistic:

$$J = n^2 \sum_{i=1}^{n} \left(\frac{x_i - \frac{i}{n+1}}{i\,(n-i+1)} \right)^2 - n \left(\sum_{i=1}^{n} \frac{x_i - \frac{i}{n+1}}{i\,(n-i+1)} \right)^2 .$$

The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

`statistic`	the value of the Sarkadi-Kosik statistic.
`p.value`	the p-value for the test.
`method`	the character string "Sarkadi-Kosik test for uniformity".
`data.name`	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Kosik P., Sarkadi K. A new goodness-of-fit test // Proc. of 5-th Pannonian Symp. of Math. Stat., Visegrad, Hungary, 20 24 May, 1985. P. 267 272.

Examples

```
sarkadi.unif.test(runif(100,0,1))
sarkadi.unif.test(runif(100,0.1,0.9))
```

sherman.unif.test *Sherman test for uniformity*

Description

Performs Sherman test for the hypothesis of uniformity, see Sherman (1950).

Usage

```
sherman.unif.test(x, nrepl=2000)
```

Arguments

x	a numeric vector of data values.
nrepl	the number of replications in Monte Carlo simulation.

Details

The Sherman test for uniformity is based on the following statistic:

$$B_n = \frac{1}{2}\sum_{i=1}^{n+1}\left|X_{(i)} - X_{(i-1)} - \frac{1}{n+1}\right|,$$

where $X_{(0)} = 0$, $X_{(n+1)} = 1$. The p-value is computed by Monte Carlo simulation.

Value

A list with class "htest" containing the following components:

statistic	the value of the Sherman statistic.
p.value	the p-value for the test.
method	the character string "Sherman test for uniformity".
data.name	a character string giving the name(s) of the data.

Author(s)

Maxim Melnik and Ruslan Pusev

References

Sherman, B. (1950): A random variable related to the spacing of sample values. — Ann. Math. Stat., vol. 21, pp. 339–361.

Examples

```
sherman.unif.test(runif(100,0,1))
sherman.unif.test(runif(100,0.1,0.9))
```

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