

## Teste das sequências em R

### ### Teste das sequências de Wald-Wolfowitz

```
library(randomizeBE)
```

#### ## 1. Distribuição exata

```
n1 <- 11
```

```
n2 <- 9
```

```
n <- n1 + n2
```

```
# Função massa de probabilidade
```

```
# pruns.exact: função distribuição acumulada
```

```
fmp <- numeric(n - 2 + 1)
```

```
fda0 <- 0
```

```
for (r in 2:n) {
```

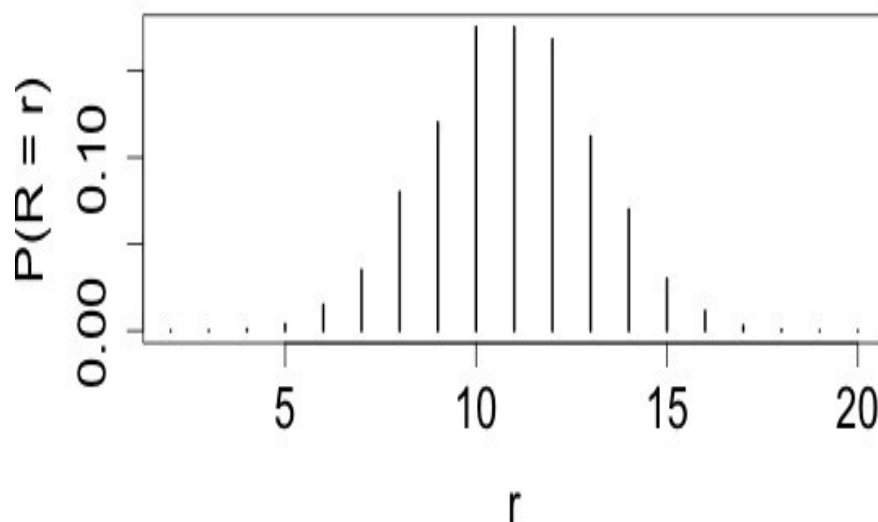
```
  fda <- pruns.exact(r, n1, n2, tail = "lower")
```

```
  fmp[r - 1] <- fda - fda0
```

```
  fda0 <- fda
```

```
}
```

```
plot(2:n, fmp, type = "h", xlab = "r", ylab = "P(R = r)", lwd = 2,  
     cex.lab = 1.5, cex.axis = 1.5)
```



#### ## 2. Exemplos

```
# runs.pvalue: cálculo do valor-p para H1 bilateral
```

```
# Primeiro argumento deve ser um vetor numérico
```

```
# Dicotomização com a mediana se existirem mais de dois valores diferentes
```

```
# 2.1. x ~ N(0, 1)
set.seed(2018)
x <- rnorm(50)
runs.pvalue(x, pmethod = "exact")
```

0.4231872

```
runs.pvalue(x, pmethod = "normal")
```

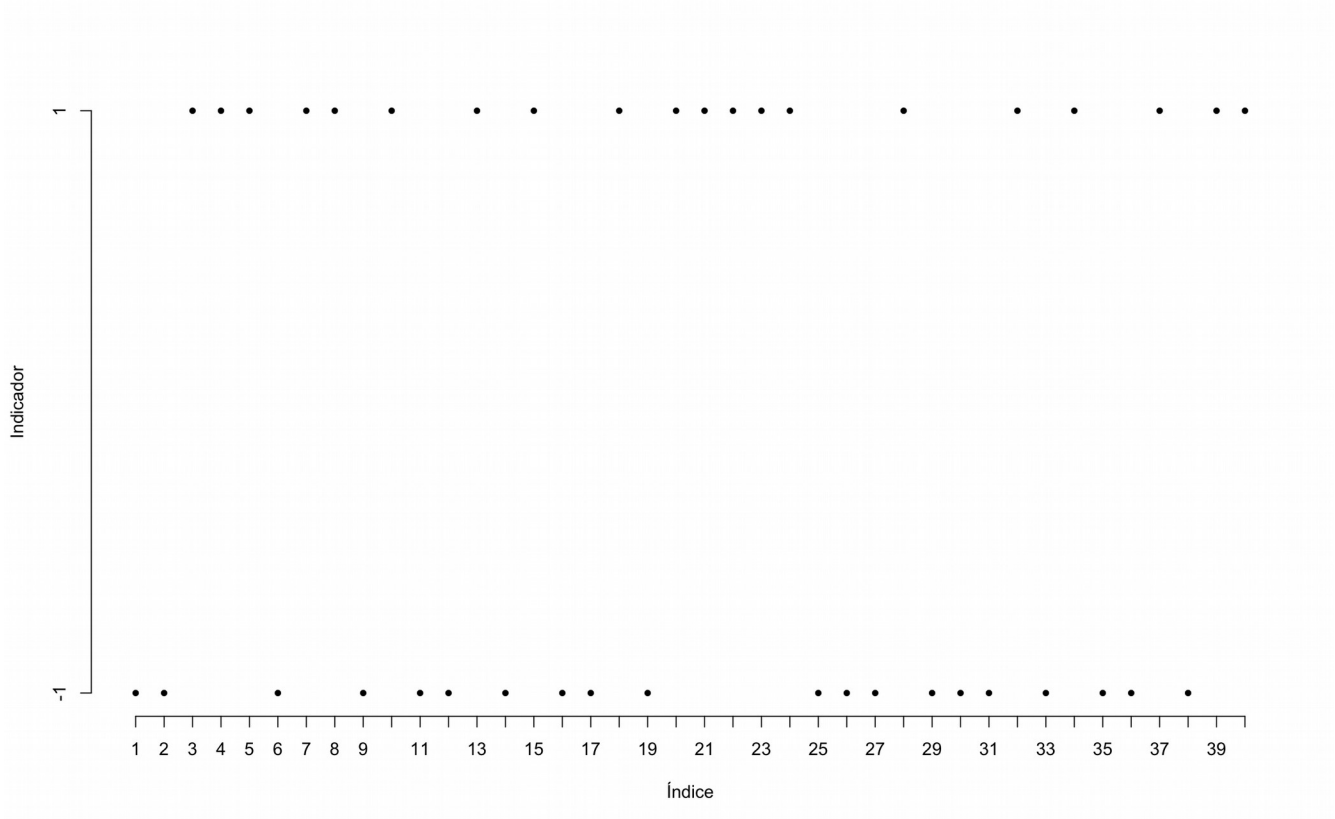
0.3365095

```
runs.pvalue(x, pmethod = "cc")
```

0.4231872

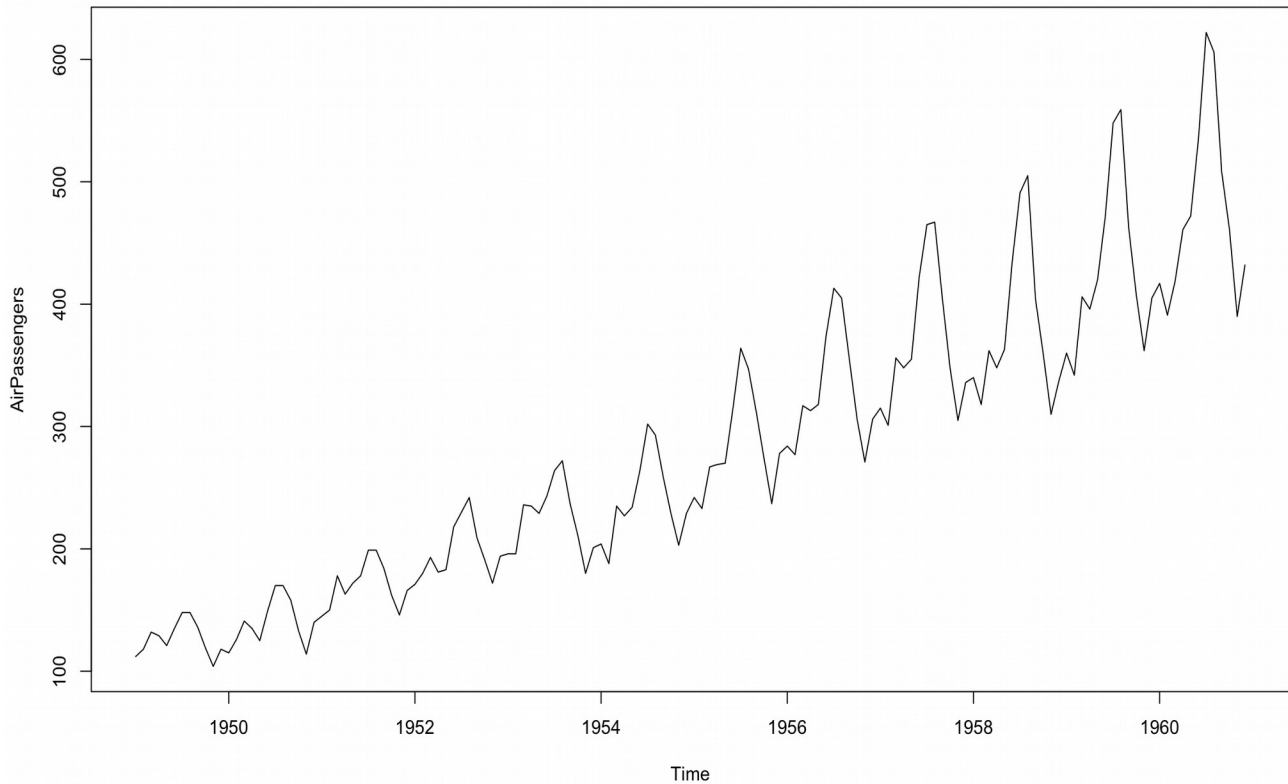
Nota 1. Qual o número de corridas neste exemplo?

```
md <- median(x)
y <- ifelse(x >= md, 1, -1)
ind <- which(x == md)
if (length(ind) > 0) y <- y[-ind]
plot(y, pch = 20, axes = FALSE, xlab = "Índice", ylab = "Indicador")
axis(1, 1:length(y))
axis(2, c(-1, 1))
```



```
# 2.2. Monthly airline passenger numbers 1949-1960 (n = 144)
# Conjunto de dados AirPassengers do pacote datasets
```

```
plot(AirPassengers)
```



```
runs.pvalue(AirPassengers, pmethod = "exact")
```

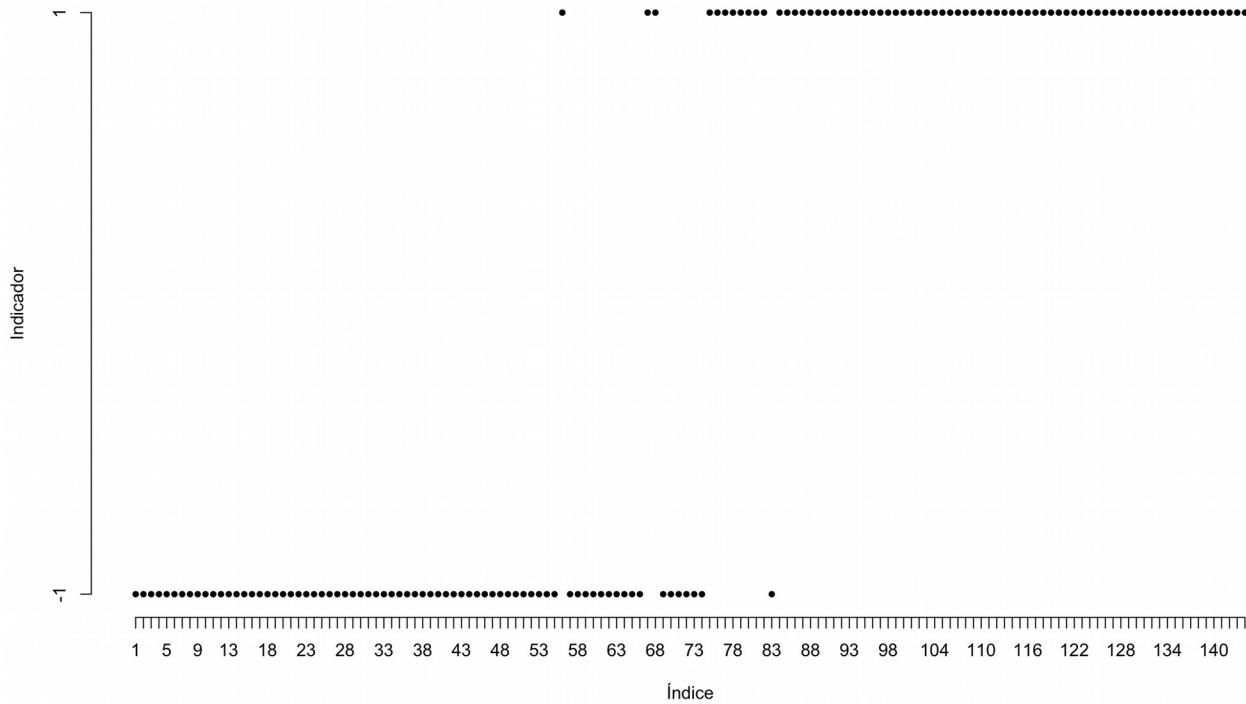
```
3.931479e-27
```

```
runs.pvalue(AirPassengers, pmethod = "normal")
```

```
1.577406e-27
```

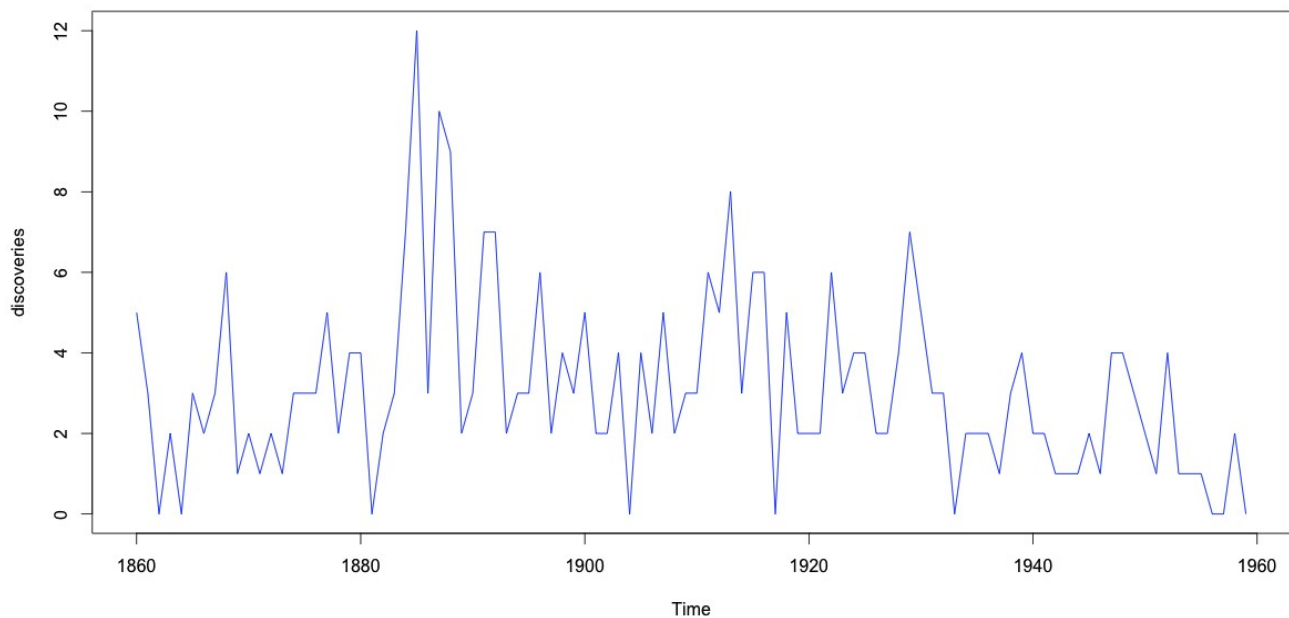
```
runs.pvalue(AirPassengers, pmethod = "cc")
```

```
3.931479e-27
```



```
# 2.3. The numbers of "great" inventions and scientific discoveries
#       in each year from 1860 to 1959 (n = 100)
# Conjunto de dados discoveries do pacote datasets

plot(discoveries, col = "blue")
```



Existem observações com valor igual à mediana amostral.

```
x <- as.numeric(discoveries)
cat("\n Mediana =", md <- median(x))
```

```
Mediana = 3
```

No comando abaixo, a variável `x` é dicotomizada usando a regra do pacote `randomizeBE`.

```
y <- ifelse(x >= md, 1, -1)
(ind <- which(x == md))
```

```
2 6 8 15 16 17 24 27 31 35 36 40 50 51 55 64 72 73 79 90
```

```
if (length(ind) > 0) y <- y[-ind]
```

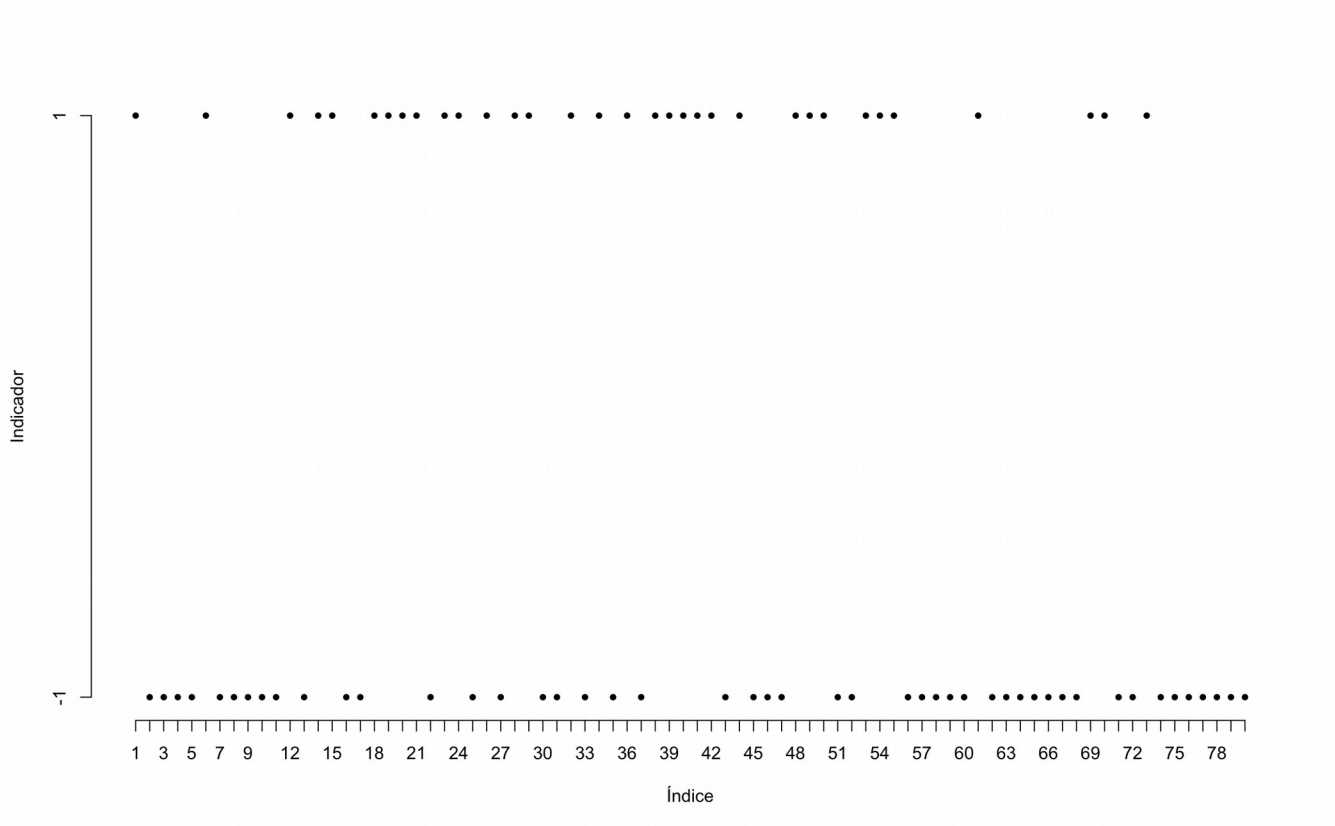
A função `runs.pvalue` não elimina as observações com valor igual à mediana amostral, de modo que os resultados abaixo se justificam.

```
runs.pvalue(discoveries, pmethod = "exact")
```

```
0.01293409
```

```
runs.pvalue(y, pmethod = "exact")
```

```
0.4469061
```



Nota 2. O teste das seqüências apresenta baixo poder.