Prueba de los signos

Parámetros teóricos

```
> mu <- sample(seq(5,6,.1),1); sigma <- 1
```

Generación de la muestra

```
> n <- 14
> x <- rnorm(n, mu, sigma)
> xo <- sort(x) # muestra ordenada
> alfa <- 0.05
```

Intervalo de confianza de la mediana

```
> c1 <- qbinom(alfa/2, n, .5)
> c2 <- n-c1 # B(n,.5) es simétrica
> P <- function(a,b) sum(dbinom(a:b,n,.5))
> p <- P(c1+1,c2-1) # P(4,10)=0.942627
> if (p >= 1-alfa) stop("IC=(",xo[c1+1],",",xo[c2],")")
> P(c1,c2) # P(3,11)=0.9870605
> cat("IC = (",xo[c1],",",xo[c2+1],")\n")
> # IC = ( 4.610136 , 6.250654 )
> # podría existir intervalo asimétrico más corto
> p <- P(c1,c2-1) # P(3,10) = 0.9648437
> if (p>=1-alfa) cat ("IC = (",xo[c1],",",xo[c2],")\n")
> # IC = ( 4.610136 , 5.915553 )
> p <- P(c1+1,c2) # P(4,11) = 0.9648437
> if (p>=1-alfa) cat ("IC = (",xo[c1+1],",",xo[c2+1],")\n")
> IC = ( 4.649658 , 6.250654 )
```

IC suponiendo distribución gausiana → mediana=media

```
> t.test (x, conf=1-alfa) $ conf.int
[1] 4.958503 5.928990
attr(,"conf.level")
[1] 0.95
```

Prueba de los signos en R básico

```
> mu0 <- 5 # H0: mediana = mu0 , H1: mediana ≠ mu0
> s <- sum(x>mu0)  # valor del estadístico (s=9)
> binom.test(s,n) $ p.value   # 0.4239502
> pv1 <- pbinom(s, n, .5)     # P(U ≤ s)
> pv2 <- 1-pbinom(s-1, n, .5) # P(U ≥ s)
> pvalor <- 2*min(pv1, pv2)   # 0.4239502
```

Prueba de los signos con paquetes de R

```
> BSDA::SIGN.test(x, md=mu0)
```

```
        One-sample Sign-Test

data:  x
s = 9, p-value = 0.424
alternative hypothesis: true median is not equal to 5
95 percent confidence interval:
 4.643100 5.971158
sample estimates:
median of x
   5.590664

Achieved and Interpolated Confidence Intervals:

                  Conf.Level L.E.pt U.E.pt
Lower Achieved CI     0.9426 4.6497 5.9156
Interpolated CI       0.9500 4.6431 5.9712
Upper Achieved CI     0.9871 4.6101 6.2507

> DescTools::SignTest(x, mu=mu0)

        One-sample Sign-Test

data:  x
S = 9, number of differences = 14, p-value = 0.424
alternative hypothesis: true median is not equal to 5
98.7 percent confidence interval:
 4.610136 6.250654
sample estimates:
median of the differences
                 5.590664
```