**Ejemplo 2.7**

> x <- rnorm(4)

> X <- x\*sqrt(114.09)/sd(x)

> y <- rnorm(7)

> Y <- y\*sqrt(16.08)/sd(y)

> var(X)

[1] 114.09

> var(Y)

[1] 16.08

> var.test(X,Y,ratio=1,"greater")

 **F test to compare two variances**

data: X and Y

F = 7.0951, num df = 3, denom df = 6, **p-value = 0.02125**

alternative hypothesis: true ratio of variances is greater than 1

95 percent confidence interval:

 1.491498 Inf

sample estimates:

ratio of variances

 7.095149

**Ejemplo 2.8**

> X <- c(26.2, 29.3, 31.3, 28.7, 27.4, 25.1, 26.0, 27.2, 27.5, 29.8, 32.6, 34.6)

> Y <- c(25.3, 28.2, 29.2, 27.1, 26.8, 26.5, 30.7, 31.3, 26.3, 24.2)

> var.test(X,Y,ratio=1)

 **F test to compare two variances**

data: X and Y

F = 1.5735, num df = 11, denom df = 9, p-value = 0.5053

alternative hypothesis: true ratio of variances is not equal to 1

95 percent confidence interval:

 0.4022178 5.6455803

sample estimates: ratio of variances

 1.573506

> t.test(X,Y,alternative="two.sided",mu=0,var.equal = TRUE)

 **Two Sample t-test**

data: X and Y

t = 1.1142, df = 20, p-value = 0.2784

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

 -1.088710 3.585377

sample estimates:

mean of x mean of y

 28.80833 27.56000

**Ejemplo 2.8 (Asumiendo varianzas desiguales)**

> t.test(X,Y,alternative="two.sided",mu=0)

 **Welch Two Sample t-test**

data: X and Y

t = 1.1382, df = 19.976, p-value = 0.2685

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

 -1.039741 3.536408

sample estimates:

mean of x mean of y

 28.80833 27.56000

**Ejemplo 2.9**

> Antes <- c(102, 120, 135, 114, 175)

> Despues <- c(110, 125, 141, 113, 182)

> t.test(Antes,Despues,alternative="less",paired = TRUE)

 **Paired t-test**

data: Antes and Despues

t = -3.1623, df = 4, p-value = 0.01705

alternative hypothesis: true difference in means is less than 0

95 percent confidence interval:

 -Inf -1.629254

sample estimates: mean of the differences

 -5

> t.test(Antes,Despues,alternative="less",paired = FALSE)

 **Welch Two Sample t-test**

data: Antes and Despues

t = -0.27446, df = 7.9874, p-value = 0.3953

alternative hypothesis: true difference in means is less than 0

95 percent confidence interval:

 -Inf 28.8834

sample estimates:

mean of x mean of y

 129.2 134.2

**Ejemplo 2.11**

> x <- runif(151)

> X <- 85.8 + (x - mean(x))\*19.3/sd(x)

> y <- runif(108)

> Y <- 71.5 + (y - mean(y))\*12.2/sd(y)

> t.test(X,Y,alternative="two.sided")

 **Welch Two Sample t-test**

data: X and Y

t = 7.2927, df = 253.5, p-value = 3.876e-12

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

 10.43835 18.16165

sample estimates:

mean of x mean of y

 85.8 71.5

**> 2\*(1-pnorm(7.2927))**

**[1] 3.03757e-13**