two populations dependent

muqiitsaputra

2/21/2020

```
######## Richard Johnson Ed. 5 p. 275 ########
x1j1 <- c(6,6,18,8,11,34,28,71,43,33,20)
x1j2 <- c(27,23,64,44,30,75,26,124,54,30,14)
x2j1 <- c(25,28,36,35,15,44,42,54,34,29,39)
x2j2 <- c(15,13,22,29,31,64,30,64,56,20,21)
d1 <- x1j1 - x2j1
d2 <- x1j2 - x2j2
d <- matrix(c(d1, d2), ncol = 2)
n <- nrow(d)

j <- matrix(1, n, n)
Sd <- 1/(n-1) * t(d) %*% (diag(n) - j/n) %*% d

cat("Matriks d\n\n")

## Matriks d

d

##       [,1] [,2]
##  [1,]  -19   12
##  [2,]  -22   10
##  [3,]  -18   42
##  [4,]  -27   15
##  [5,]   -4   -1
##  [6,]  -10   11
##  [7,]  -14   -4
##  [8,]   17   60
##  [9,]    9   -2
## [10,]    4   10
## [11,]  -19   -7
```

```r
cat("Matriks j\n\n")
```

```
## Matriks j
```

```r
j
```

```
##       [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11]
##  [1,]    1    1    1    1    1    1    1    1    1     1     1
##  [2,]    1    1    1    1    1    1    1    1    1     1     1
##  [3,]    1    1    1    1    1    1    1    1    1     1     1
##  [4,]    1    1    1    1    1    1    1    1    1     1     1
##  [5,]    1    1    1    1    1    1    1    1    1     1     1
##  [6,]    1    1    1    1    1    1    1    1    1     1     1
##  [7,]    1    1    1    1    1    1    1    1    1     1     1
##  [8,]    1    1    1    1    1    1    1    1    1     1     1
##  [9,]    1    1    1    1    1    1    1    1    1     1     1
## [10,]    1    1    1    1    1    1    1    1    1     1     1
## [11,]    1    1    1    1    1    1    1    1    1     1     1
```

```r
cat("Matriks Sd\n\n")
```

```
## Matriks Sd
```

```r
Sd
```

```
##           [,1]      [,2]
## [1,] 199.25455  88.30909
## [2,]  88.30909 418.61818
```

```r
# Uji Beda Rata-rata 2 Populasi Dependen (Statistic Uji T2 Hotelling's)
dbar <- matrix(c(mean(d1), mean(d2)))
p <- ncol(d)
a <- .05
T2 = n * t(dbar) %*% solve(Sd) %*% dbar
T2tab = p*(n-1) / (n-p) * qf(1 - a, p, n - p)

if(T2 > T2tab){
  cat(T2, ">", T2tab, "\nTolak H0")
}else{
  cat(T2, "<", T2tab,"\nGagal tolak H0")
}
```

```
## 13.63931 > 9.458877
## Tolak H0
```

```r
# Menghitung Selang Kepercayaan
ci1 <- mean(d1) + c(c(-1,1) * (T2tab * Sd[1,1] / n)^0.5)
ci2 <- mean(d2) + c(c(-1,1) * (T2tab * Sd[2,2] / n)^0.5)
cat("d1\n", d1, "\n\nd2\n", d2)
```

```
## d1
##  -19 -22 -18 -27 -4 -10 -14 17 9 4 -19
##
## d2
##  12 10 42 15 -1 11 -4 60 -2 10 -7
```

```r
cat("\n\nSelang Delta1 (95%) \n", ci1[1], ci1[2], "\n\nSelang Delta2
(95%)\n", ci2[1], ci2[2])
```

```
##
##
## Selang Delta1 (95%)
##  -22.45327 3.726
##
## Selang Delta2 (95%)
##  -5.700119 32.24557
```