**Ejercicio 1 – Hoja 4**

T1 <- c(8, 11, 10)

T2 <- c(3, 2, 1, 3, 2)

T3 <- c(3, 4, 5, 4)

Duracion <- c(T1,T2,T3)

Block <- c(rep(1,length(T1)), rep(2,length(T2)), rep(3,length(T3)))

Block <- factor(Block)

**a)**

boxplot(Duracion ~ Block)

**b)**

anova.fit <- aov(Duracion ~ Block)

anova.fit

Call:

 **aov(formula = Duracion ~ Block)**

Terms:

 Block Residuals

Sum of Squares 107.20000 9.46667

Deg. of Freedom 2 9

Residual standard error: 1.025598

Estimated effects may be unbalanced

**c)**

summary(anova.fit)

 Df Sum Sq Mean Sq F value Pr(>F)

Block 2 107.20 53.60 50.96 1.23e-05 \*\*\*

Residuals 9 9.47 1.05

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**d)**

TukeyHSD(anova.fit)

 **Tukey multiple comparisons of means**

 95% family-wise confidence level

Fit: aov(formula = Duracion ~ Block)

$Block

 diff lwr upr p adj

2-1 -7.466667 -9.5578540 -5.375479 0.0000098

3-1 -5.666667 -7.8536827 -3.479651 0.0001297

3-2 1.800000 -0.1208782 3.720878 0.0657371

plot(TukeyHSD(anova.fit))

**Ejercicio 2 – Hoja 4**

Lab1 <- c(2.3, 4.1, 4.9, 2.5, 3.1, 3.7)

Lab2 <- c(6.5, 4.0, 4.2, 6.3, 4.4)

Lab3 <- c(1.7, 2.7, 4.1, 1.6, 4.1, 2.8)

Lab4 <- c(2.1, 3.8, 4.8, 2.8, 4.8, 3.7, 4.2)

Lab5 <- c(8.5, 5.5, 6.1, 8.2)

PPb <- c(Lab1, Lab2, Lab3, Lab4, Lab5)

Block <- c(rep(1,length(Lab1)), rep(2,length(Lab2)), rep(3,length(Lab3)), rep(4,length(Lab4)), rep(5,length(Lab5)))

Block <- factor(Block)

**a)**

boxplot(PPb ~ Block)

**b)**

anova.fit <- aov(PPb ~ Block)

anova.fit

Call:

 **aov(formula = PPb ~ Block)**

Terms:

 Block Residuals

Sum of Squares 53.13033 29.63931

Deg. of Freedom 4 23

Residual standard error: 1.135194

Estimated effects may be unbalanced

**c)**

summary(anova.fit)

 Df Sum Sq Mean Sq F value Pr(>F)

Block 4 53.13 13.283 10.31 6.23e-05 \*\*\*

Residuals 23 29.64 1.289

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**d)**

TukeyHSD(anova.fit)

 **Tukey multiple comparisons of means 95% family-wise confidence level**

Fit: aov(formula = PPb ~ Block)

$Block

 diff lwr upr p adj

2-1 1.6466667 -0.3852874 3.6786207 0.1523425

3-1 -0.6000000 -2.5373921 1.3373921 0.8880232

4-1 0.3095238 -1.5573940 2.1764416 0.9875187

5-1 3.6416667 1.4755964 5.8077369 0.0004414

3-2 -2.2466667 -4.2786207 -0.2147126 0.0252889

4-2 -1.3371429 -3.3020171 0.6277314 0.2920252

5-2 1.9950000 -0.2560463 4.2460463 0.0995183

4-3 0.9095238 -0.9573940 2.7764416 0.6093194

5-3 4.2416667 2.0755964 6.4077369 0.0000611

5-4 3.3321429 1.2288706 5.4354151 0.0008866