MidSem

Andrea Lebon-1740223

17 September 2019

library(readxl)

## Warning: package 'readxl' was built under R version 3.6.1

datafile = read\_excel("C:/Users/lebon/Desktop/q1.xlsx")  
attach(datafile)  
View(datafile)

model = aov(Treatment~Brand,data=datafile)  
summary(model)

## Df Sum Sq Mean Sq F value Pr(>F)   
## Brand 3 67.5 22.500 5.806 0.0109 \*  
## Residuals 12 46.5 3.875   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

library(agricolae)

## Warning: package 'agricolae' was built under R version 3.6.1

result = LSD.test(model,"Brand",p.adj="bonferroni",alpha=0.01)  
result

## $statistics  
## MSerror Df Mean CV t.value MSD  
## 3.875 12 5 39.37004 4.030845 5.610698  
##   
## $parameters  
## test p.ajusted name.t ntr alpha  
## Fisher-LSD bonferroni Brand 4 0.01  
##   
## $means  
## Treatment std r LCL UCL Min Max Q25 Q50 Q75  
## A 8.00 1.825742 4 4.9935664 11.006434 6 10 6.75 8.0 9.25  
## B 3.50 1.732051 4 0.4935664 6.506434 2 6 2.75 3.0 3.75  
## C 5.75 2.629956 4 2.7435664 8.756434 2 8 5.00 6.5 7.25  
## D 2.75 1.500000 4 -0.2564336 5.756434 1 4 1.75 3.0 4.00  
##   
## $comparison  
## NULL  
##   
## $groups  
## Treatment groups  
## A 8.00 a  
## C 5.75 a  
## B 3.50 a  
## D 2.75 a  
##   
## attr(,"class")  
## [1] "group"

datafile2 = read\_excel("C:/Users/lebon/Desktop/q2.xlsx")  
attach(datafile2)  
View(datafile2)

Treatments<-as.factor(datafile2$Treatments)  
Groups<-as.factor(datafile2$Group)  
Type <- as.factor(datafile2$Type)  
str(datafile2)

## Classes 'tbl\_df', 'tbl' and 'data.frame': 9 obs. of 3 variables:  
## $ Type : chr "Marble" "Granite" "Tile" "Marble" ...  
## $ Group : chr "G1" "G1" "G1" "G2" ...  
## $ Treatments: num 8 9 6 9 6 7 5 10 8

m1 <- aov(datafile2$Treatments ~ datafile2$Type + datafile2$Group)   
summary(m1)

## Df Sum Sq Mean Sq F value Pr(>F)  
## datafile2$Type 2 2.889 1.444 0.302 0.755  
## datafile2$Group 2 0.222 0.111 0.023 0.977  
## Residuals 4 19.111 4.778

lm1 <- lm(datafile2$Treatments~datafile2$Type+datafile2$Group)   
library(lsmeans)

## Warning: package 'lsmeans' was built under R version 3.6.1

## Loading required package: emmeans

## Warning: package 'emmeans' was built under R version 3.6.1

## The 'lsmeans' package is now basically a front end for 'emmeans'.  
## Users are encouraged to switch the rest of the way.  
## See help('transition') for more information, including how to  
## convert old 'lsmeans' objects and scripts to work with 'emmeans'.

lsm1 <- lsmeans(lm1,"Type")   
pairs(lsm1)

## contrast estimate SE df t.ratio p.value  
## Granite - Marble 1.000 1.78 4 0.560 0.8472   
## Granite - Tile 1.333 1.78 4 0.747 0.7514   
## Marble - Tile 0.333 1.78 4 0.187 0.9810   
##   
## Results are averaged over the levels of: Group   
## P value adjustment: tukey method for comparing a family of 3 estimates

library(multcompView)

## Warning: package 'multcompView' was built under R version 3.6.1

CLD(lsm1,Letters = "abc")

## Warning: 'CLD' will be deprecated. Its use is discouraged.  
## See '? CLD' for an explanation. Use 'pwpp' or 'multcomp::cld' instead.

## Type lsmean SE df lower.CL upper.CL .group  
## Tile 7.00 1.26 4 3.50 10.5 a   
## Marble 7.33 1.26 4 3.83 10.8 a   
## Granite 8.33 1.26 4 4.83 11.8 a   
##   
## Results are averaged over the levels of: Group   
## Confidence level used: 0.95   
## P value adjustment: tukey method for comparing a family of 3 estimates   
## significance level used: alpha = 0.05

lsm2 = lsmeans(lm1, "Group")   
lsm2

## Group lsmean SE df lower.CL upper.CL  
## G1 7.67 1.26 4 4.16 11.2  
## G2 7.33 1.26 4 3.83 10.8  
## G3 7.67 1.26 4 4.16 11.2  
##   
## Results are averaged over the levels of: Type   
## Confidence level used: 0.95

pairs(lsm2)

## contrast estimate SE df t.ratio p.value  
## G1 - G2 0.333 1.78 4 0.187 0.9810   
## G1 - G3 0.000 1.78 4 0.000 1.0000   
## G2 - G3 -0.333 1.78 4 -0.187 0.9810   
##   
## Results are averaged over the levels of: Type   
## P value adjustment: tukey method for comparing a family of 3 estimates

CLD(lsm2,Letters = "abcdef")

## Warning: 'CLD' will be deprecated. Its use is discouraged.  
## See '? CLD' for an explanation. Use 'pwpp' or 'multcomp::cld' instead.

## Group lsmean SE df lower.CL upper.CL .group  
## G2 7.33 1.26 4 3.83 10.8 a   
## G1 7.67 1.26 4 4.16 11.2 a   
## G3 7.67 1.26 4 4.16 11.2 a   
##   
## Results are averaged over the levels of: Type   
## Confidence level used: 0.95   
## P value adjustment: tukey method for comparing a family of 3 estimates   
## significance level used: alpha = 0.05