**#Package loaded**

library(broom)

library(multcomp)

library(multcompView)

library(dplyr)

library(readr)

library(readxl)

library(writexl)

**#Reading the dataset**

library(readr)

data <- read\_csv("C:/Users/User/Documents/multivariate\_data\_1\_days.csv")

**#Data preparation**

data$Lact\_Days <- as.factor(data$Lact\_Days)

str(data$Lact\_Days)

**#ANOVA for PredictedValueActivity with Days (Lact\_Days)**

anova <-aov(PredictedValueActivity~Lact\_Days, data=data)

**#Creating ANOVA summary table**

anova\_summary\_table<-summary(anova)[[1]]

**#Converting ANOVA results into datafram**

anova\_summary\_df<-as.data.frame(anova\_summary\_table)

**#Saving the ANOVA summary table into csv file**

#write.csv(anova\_summary\_table, "anova\_activity\_days\_1\_days.csv")

**#Performing the Tukey’s Test**

#Pairwise comparison\_Post hoc\_Tukey  
library(rcompanion)  
tukey = aov(PredictedValueActivity~Lact\_Days, data = data)  
TUK = TukeyHSD(tukey, "Lact\_Days", ordered = TRUE)  
TUK = as.data.frame(TUK$Lact\_Days)  
names(TUK) = gsub(" ", ".", names(TUK))  
HSD = data.frame(Comparison=row.names(TUK),  
 diff=TUK$diff, lwr=TUK$lwr, uwr=TUK$upr, p.adj=TUK$p.adj)

**#Saving the Tukey HSD Results**

#write.csv(HSD, "HSD\_activity\_day\_1\_days.csv")

**#Creating superscripts letters based on significance level**

cld\_results = cldList(p.adj~Comparison, data=HSD, threshold=0.05, remove.space=FALSE)

**# Saving the results with superscript letters**

write.csv(cld\_results, "superscripts\_activity\_days\_ 1\_days.csv")

**#ANOVA for PredictedValueRestTime with Days (Lact\_Days)**

anova <-aov(PredictedValueRestTime~Lact\_Days, data=data)

**#Creating ANOVA summary table**

anova\_summary\_table<-summary(anova)[[1]]

**#Converting ANOVA results into datafram**

anova\_summary\_df<-as.data.frame(anova\_summary\_table)

**#Saving the ANOVA summary table into csv file**

#write.csv(anova\_summary\_table, "anova\_rest\_time \_days\_ 1\_days.csv")

**#Performing the Tukey’s Test**

#Pairwise comparison\_Post hoc\_Tukey  
library(rcompanion)  
tukey = aov(PredictedValueRestTime~Lact\_Days, data = data)  
TUK = TukeyHSD(tukey, "Lact\_Days", ordered = TRUE)  
TUK = as.data.frame(TUK$Lact\_Days)  
names(TUK) = gsub(" ", ".", names(TUK))  
HSD = data.frame(Comparison=row.names(TUK),  
 diff=TUK$diff, lwr=TUK$lwr, uwr=TUK$upr, p.adj=TUK$p.adj)

**#Saving the Tukey HSD Results**

#write.csv(HSD, "HSD\_rest\_time\_day\_ 1\_days.csv")

**#Creating superscripts letters based on significance level**

cld\_results = cldList(p.adj~Comparison, data=HSD, threshold=0.05, remove.space=FALSE)

**# Saving the results with superscript letters**

write.csv(cld\_results, "superscripts\_rest\_time\_days\_ 1\_days.csv")

**#ANOVA for PredictedValueRestPerBout with Days (Lact\_Days)**

anova <-aov(PredictedValueRestPerBout~Lact\_Days, data=data)

**#Creating ANOVA summary table**

anova\_summary\_table<-summary(anova)[[1]]

**#Converting ANOVA results into datafram**

anova\_summary\_df<-as.data.frame(anova\_summary\_table)

**#Saving the ANOVA summary table into csv file**

#write.csv(anova\_summary\_table, "anova\_rest\_per\_bout\_days\_ 1\_days.csv")

**#Performing the Tukey’s Test**

#Pairwise comparison\_Post hoc\_Tukey  
library(rcompanion)  
tukey = aov(PredictedValueRestPerBout~Lact\_Days, data = data)  
TUK = TukeyHSD(tukey, "Lact\_Days", ordered = TRUE)  
TUK = as.data.frame(TUK$Lact\_Days)  
names(TUK) = gsub(" ", ".", names(TUK))  
HSD = data.frame(Comparison=row.names(TUK),  
 diff=TUK$diff, lwr=TUK$lwr, uwr=TUK$upr, p.adj=TUK$p.adj)

**#Saving the Tukey HSD Results**

#write.csv(HSD, "HSD\_rest\_per\_bout\_day\_ 1\_days.csv")

**#Creating superscripts letters based on significance level**

cld\_results = cldList(p.adj~Comparison, data=HSD, threshold=0.05, remove.space=FALSE)

**# Saving the results with superscript letters**

write.csv(cld\_results, "superscripts\_rest\_per\_bout\_days\_ 1\_days.csv")

**#ANOVA for PredictedValueRestlessnessRatio with Days (Lact\_Days)**

anova <-aov(PredictedValueRestlessnessRatio~Lact\_Days, data=data)

**#Creating ANOVA summary table**

anova\_summary\_table<-summary(anova)[[1]]

**#Converting ANOVA results into datafram**

anova\_summary\_df<-as.data.frame(anova\_summary\_table)

**#Saving the ANOVA summary table into csv file**

#write.csv(anova\_summary\_table, "anova\_restlessness\_ratio\_days\_ 1\_days.csv")

**#Performing the Tukey’s Test**

#Pairwise comparison\_Post hoc\_Tukey  
library(rcompanion)  
tukey = aov(PredictedValueRestlessnessRatio~Lact\_Days, data = data)  
TUK = TukeyHSD(tukey, "Lact\_Days", ordered = TRUE)  
TUK = as.data.frame(TUK$Lact\_Days)  
names(TUK) = gsub(" ", ".", names(TUK))  
HSD = data.frame(Comparison=row.names(TUK),  
 diff=TUK$diff, lwr=TUK$lwr, uwr=TUK$upr, p.adj=TUK$p.adj)

**#Saving the Tukey HSD Results**

#write.csv(HSD, "HSD\_restlessness\_ratio\_day\_ 1\_days.csv")

**#Creating superscripts letters based on significance level**

cld\_results = cldList(p.adj~Comparison, data=HSD, threshold=0.05, remove.space=FALSE)

**# Saving the results with superscript letters**

write.csv(cld\_results, "superscripts\_restlessness\_ratio\_days\_ 1\_days.csv")

**#Month**

**#Package loaded**

library(broom)

library(multcomp)

library(multcompView)

library(dplyr)

library(readr)

library(readxl)

library(writexl)

**#Reading the dataset**

library(readr)

data <- read\_csv("C:/Users/User/Documents/multivariate\_data\_month3.csv")

**#Data preparation**

data$Lact\_Days <- as.factor(data$Lact\_Month)

str(data$Lact\_Month)

**#ANOVA for PredictedValueActivity with Month (Lact\_Month)**

anova <-aov(PredictedValueActivity~Lact\_Month, data=data)

**#Creating ANOVA summary table**

anova\_summary\_table<-summary(anova)[[1]]

**#Converting ANOVA results into datafram**

anova\_summary\_df<-as.data.frame(anova\_summary\_table)

**#Saving the ANOVA summary table into csv file**

#write.csv(anova\_summary\_table, "anova\_activity\_ month6.csv")

**#Performing the Tukey’s Test**

#Pairwise comparison\_Post hoc\_Tukey  
library(rcompanion)  
tukey = aov(PredictedValueActivity~Lact\_Month, data = data)  
TUK = TukeyHSD(tukey, "Lact\_Month", ordered = TRUE)  
TUK = as.data.frame(TUK$Lact\_Month)  
names(TUK) = gsub(" ", ".", names(TUK))  
HSD = data.frame(Comparison=row.names(TUK),  
 diff=TUK$diff, lwr=TUK$lwr, uwr=TUK$upr, p.adj=TUK$p.adj)

**#Saving the Tukey HSD Results**

write.csv(HSD, "HSD\_activity\_ month3.csv")

**#Creating superscripts letters based on significance level**

cld\_results = cldList(p.adj~Comparison, data=HSD, threshold=0.05, remove.space=FALSE)

**# Saving the results with superscript letters**

write.csv(cld\_results, "superscripts\_activity\_ month3.csv")

**#ANOVA for PredictedValueRestTime with Month (Lact\_Month)**

anova <-aov(PredictedValueRestTime~Lact\_Month, data=data)

**#Creating ANOVA summary table**

anova\_summary\_table<-summary(anova)[[1]]

**#Converting ANOVA results into datafram**

anova\_summary\_df<-as.data.frame(anova\_summary\_table)

**#Saving the ANOVA summary table into csv file**

write.csv(anova\_summary\_table, "anova\_rest\_time\_month6.csv")

**#Performing the Tukey’s Test**

#Pairwise comparison\_Post hoc\_Tukey  
library(rcompanion)  
tukey = aov(PredictedValueRestTime~Lact\_Month, data = data)  
TUK = TukeyHSD(tukey, "Lact\_Month", ordered = TRUE)  
TUK = as.data.frame(TUK$Lact\_Month)  
names(TUK) = gsub(" ", ".", names(TUK))  
HSD = data.frame(Comparison=row.names(TUK),  
 diff=TUK$diff, lwr=TUK$lwr, uwr=TUK$upr, p.adj=TUK$p.adj)

**#Saving the Tukey HSD Results**

write.csv(HSD, "HSD\_rest\_time\_ month6.csv")

**#Creating superscripts letters based on significance level**

cld\_results = cldList(p.adj~Comparison, data=HSD, threshold=0.05, remove.space=FALSE)

**# Saving the results with superscript letters**

write.csv(cld\_results, "superscripts\_rest\_time\_ month6.csv")

**#ANOVA for PredictedValueRestPerBout with Month (Lact\_Month)**

anova <-aov(PredictedValueRestPerBout~Lact\_Month, data=data)

**#Creating ANOVA summary table**

anova\_summary\_table<-summary(anova)[[1]]

**#Converting ANOVA results into datafram**

anova\_summary\_df<-as.data.frame(anova\_summary\_table)

**#Saving the ANOVA summary table into csv file**

write.csv(anova\_summary\_table, "anova\_rest\_per\_bout\_ month6.csv")

**#Performing the Tukey’s Test**

#Pairwise comparison\_Post hoc\_Tukey  
library(rcompanion)  
tukey = aov(PredictedValueRestPerBout~Lact\_Month, data = data)  
TUK = TukeyHSD(tukey, "Lact\_Month", ordered = TRUE)  
TUK = as.data.frame(TUK$Lact\_Month)  
names(TUK) = gsub(" ", ".", names(TUK))  
HSD = data.frame(Comparison=row.names(TUK),  
 diff=TUK$diff, lwr=TUK$lwr, uwr=TUK$upr, p.adj=TUK$p.adj)

**#Saving the Tukey HSD Results**

write.csv(HSD, "HSD\_rest\_per\_bout\_ month6.csv")

**#Creating superscripts letters based on significance level**

cld\_results = cldList(p.adj~Comparison, data=HSD, threshold=0.05, remove.space=FALSE)

**# Saving the results with superscript letters**

write.csv(cld\_results, "superscripts\_rest\_per\_bout\_ month6.csv")

**#ANOVA for PredictedValueRestlessnessRatio with Month (Lact\_Month)**

anova <-aov(PredictedValueRestlessnessRatio~Lact\_Month, data=data)

**#Creating ANOVA summary table**

anova\_summary\_table<-summary(anova)[[1]]

**#Converting ANOVA results into datafram**

anova\_summary\_df<-as.data.frame(anova\_summary\_table)

**#Saving the ANOVA summary table into csv file**

write.csv(anova\_summary\_table, "anova\_restlessness\_ratio\_ month6.csv")

**#Performing the Tukey’s Test**

#Pairwise comparison\_Post hoc\_Tukey  
library(rcompanion)  
tukey = aov(PredictedValueRestlessnessRatio~Lact\_Month, data = data)  
TUK = TukeyHSD(tukey, "Lact\_Month", ordered = TRUE)  
TUK = as.data.frame(TUK$Lact\_Month)  
names(TUK) = gsub(" ", ".", names(TUK))  
HSD = data.frame(Comparison=row.names(TUK),  
 diff=TUK$diff, lwr=TUK$lwr, uwr=TUK$upr, p.adj=TUK$p.adj)

**#Saving the Tukey HSD Results**

write.csv(HSD, "HSD\_restlessness\_ratio\_ month6.csv")

**#Creating superscripts letters based on significance level**

cld\_results = cldList(p.adj~Comparison, data=HSD, threshold=0.05, remove.space=FALSE)

**# Saving the results with superscript letters**

write.csv(cld\_results, "superscripts\_restlessness\_ratio \_ month6.csv")