MidSemLab 1740256

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library(readxl) # importing the package for reading data

## Warning: package 'readxl' was built under R version 3.5.2

library(lsmeans)# for performing CLD

## Warning: package 'lsmeans' was built under R version 3.5.3

## Loading required package: emmeans

## Warning: package 'emmeans' was built under R version 3.5.3

## 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'.

library(multcompView)

## Warning: package 'multcompView' was built under R version 3.5.3

MidSem\_Q2 <- read\_excel("C:/Users/Jeevan/Desktop/Christ University/Statistics/DOE/MidSem\_Q2.xlsx") # importing the data  
# View(MidSem\_Q2) # viewing the data  
str(MidSem\_Q2) # getting the structure of the data

## Classes 'tbl\_df', 'tbl' and 'data.frame': 36 obs. of 3 variables:  
## $ Period: num 1 1 1 1 1 1 2 2 2 2 ...  
## $ Region: chr "A" "B" "C" "D" ...  
## $ Sales : num 18 9 15 22 9 10 25 7 14 18 ...

attach(MidSem\_Q2) # attaching the data for ease  
model<-aov(Sales~Region+Period) # making a 1 way ANOVA model   
summary(model) # getting a summary of the model

## Df Sum Sq Mean Sq F value Pr(>F)   
## Region 5 171.2 34.24 0.80 0.5586   
## Period 1 163.4 163.44 3.82 0.0604 .  
## Residuals 29 1240.9 42.79   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

lml = lm(Sales ~ Region+Period, data = MidSem\_Q2)  
lsm1 = lsmeans(lml, "Region")  
lsm1

## Region lsmean SE df lower.CL upper.CL  
## A 19.3 2.67 29 13.87 24.8  
## B 13.0 2.67 29 7.54 18.5  
## C 18.8 2.67 29 13.37 24.3  
## D 15.3 2.67 29 9.87 20.8  
## E 18.0 2.67 29 12.54 23.5  
## F 16.8 2.67 29 11.37 22.3  
##   
## Confidence level used: 0.95

pairs(lsm1)

## contrast estimate SE df t.ratio p.value  
## A - B 6.333 3.78 29 1.677 0.5570   
## A - C 0.500 3.78 29 0.132 1.0000   
## A - D 4.000 3.78 29 1.059 0.8933   
## A - E 1.333 3.78 29 0.353 0.9992   
## A - F 2.500 3.78 29 0.662 0.9847   
## B - C -5.833 3.78 29 -1.545 0.6395   
## B - D -2.333 3.78 29 -0.618 0.9888   
## B - E -5.000 3.78 29 -1.324 0.7697   
## B - F -3.833 3.78 29 -1.015 0.9091   
## C - D 3.500 3.78 29 0.927 0.9363   
## C - E 0.833 3.78 29 0.221 0.9999   
## C - F 2.000 3.78 29 0.530 0.9945   
## D - E -2.667 3.78 29 -0.706 0.9797   
## D - F -1.500 3.78 29 -0.397 0.9986   
## E - F 1.167 3.78 29 0.309 0.9996   
##   
## P value adjustment: tukey method for comparing a family of 6 estimates