EMS Quiz 2

Analysis of the DronesGame data files using R

1 What is the mean value of the Dependent Variable 'TPT' for the Independent Variable level 'auto' (to 2 decimal places)?

Ans. mean(auto_tpt) = 0.28

2. What is the standard deviation of the Dependent Variable 'beacon' for the Independent Variable level 'both' (to 2 decimal places)?

Ans. sd(both_beacon) = 108.89

3 What are the lowest and highest 2 values of the Dependent Variable 'd.' for the Independent Variable level "self"? (hint: use the 'sort' command)

> sort(self_d.)

Ans. **-1.620 -0.830 5.130 6.360**

[1] **-1.620 -0.830** -0.600 -0.540 -0.450 -0.330 -0.330 -0.300 -0.300 -0.240 -0.200 -0.200 -0.180 -0.170 -0.170 -0.140
[17] -0.093 -0.060 -0.060 -0.040 0.000 0.030 0.030 0.070 0.070 0.080 0.110 0.150 0.170 0.170 0.240 0.320
[33] 0.330 0.330 0.470 0.640 0.690 0.710 0.740 0.740 0.800 0.900 0.960 0.970 1.270 1.390 1.390 1.390
[49] 1.390 1.580 1.740 1.800 1.890 1.930 2.020 2.200 2.560 2.560 2.770 3.500 3.580 3.890 3.890 4.390
[65] 4.390 4.390 **5.130 6.360**

4 What would Winsorization (at c6%, or 4 values) do with lowest and highest values?

Ans. The lowest 2 values would be replaced by -0.6 and the highest 2 values would be replaced by 4.39

5 What is the value of w for a Shapiro-Wilk test on normality of the Dependent Variable 'tpt'? (hint: you first need to create a data.frame that includes the three levels of independent variable, and then you need to convert this to a data.matrix in order to perform the test)

Ans. w= 0.25153

> DM_tpt<-data.frame(auto_tpt,both_tpt,self_tpt)

```
> tmp <-data.matrix(DM_tpt)
> shapiro.test(tmp)
```

(note, for 'auto_tpt' w= 0.82726, for 'both_tpt' w = 0.67819, for 'self_tpt' w = 0.21816)

6 Using Box-Cox transformation have on the tpt data matrix you created for 4, what value of box.y do you produce?

Ans.
```
> cox2[1,]
  box.x     box.y
61     0 -551.3192
```

```
> library(MASS)
> box=boxcox(tmp~1, lambda=seq(-6,6,0.1))
> cox = data.frame(box$x, box$y)
> cox2 = cox [with(cox, order(-cox$box.y)),]
> cox2 [1,]
```

7. what effect does this have on the data?

Ans. it returns NaN for all values

(because the transform can't apply to negative numbers?)

8. If you normalize the data matrix for tpt using a log transform, what value of w for Shapiro-Wilk?

W= 0.98765

```
        Shapiro-Wilk normality test

data:  x
W = 0.98765, p-value = 0.07404
```

```
> tmp_log=log(tmp)
> shapiro.test(tmp_log)
```

9. Convert the data.frame for the tpt data into Long format (hint: use the 'reshape' function). Then run a one-way ANOVA on the data. What is the F-value you obtain?

```
> Longtpt<-reshape(tpt,varying=list(c("auto_tpt", "both_tpt", "self_tpt")),direction="long",
timevar="condition",idvar="part",v.names = "tpt")
> analysis<-aov(tpt~condition+Error(part/condition),data=Longtpt)
> summary(analysis)

Error: part
          Df Sum Sq Mean Sq F value Pr(>F)
Residuals  1  2.914   2.914

Error: part:condition
          Df Sum Sq Mean Sq
condition  1 0.1486  0.1486

Error: Within
           Df Sum Sq Mean Sq F value Pr(>F)
condition   1   1.89  1.8873    3.98 0.0474 *
Residuals 200  94.84  0.4742
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

10. Reporting of Friedman ANOVA for d.

```
> friedman.test(tpt~condition|part, data=Longtpt)

        Friedman rank sum test

data:  tpt and condition and part
Friedman chi-squared = 8.8529, df = 2, p-value = 0.01196
```

11. Wilcoxon (V, z, d values)

```
> wilcox.test(auto_d.,both_d.,paired=TRUE)

        Wilcoxon signed rank test with continuity correction

data:  auto_d. and both_d.
V = 987.5, p-value = 0.3456
alternative hypothesis: true location shift is not equal to 0


> test<-wilcox.test(auto_d.,both_d.,paired=TRUE)
> zstat<-qnorm(test$p.value/2)
> zstat
[1] -0.9432458


> abs(zstat)/sqrt(68)
[1] 0.1143854
```