Statistical Inference Assignment (Part 2)

PART A: Comparing Tooth Growth by Dosage

(1)&(2) Preliminary Analysis & Summary Analysis of Dose vs Length of Teeth

```
data(ToothGrowth);
#boxplot(ToothGrowth$len~ToothGrowth$dose, height=2 ,xlab="Vitamin C Dosage (mg)")
```

```
#creating three different subsets of data, for Low, Medium and High dose
doseLow <- subset(ToothGrowth, dose == 0.5);doseMedium <-subset(ToothGrowth, dose == 1);dose
High <- subset(ToothGrowth, dose ==2)
#standard deviation for Low dose, Medium Dose, High Dose
paste(sd(doseLow$len),sd(doseMedium$len),sd(doseHigh$len), sep=" ")
```

```
## [1] "4.49976315166172 4.41543643905882 3.77415030520987"
```

```
#Mean of each of the doese: Low, Medium, High
paste(mean(doseLow$len),mean(doseMedium$len), mean(doseHigh$len), sep="     ")
```

```
## [1] "10.605     19.735     26.1"
```

(3)Confidence Level and Hyposthesis

H0 Null Hypothesis: The differences in the means is 0
HA ALternative Hypothesis: THe differences in the means is not equal to 0

T-test of means of Low dose and medium dose
Code: t.test(doseMedium$len, doseLow$len, mu=0, paired=FALSE, var.equal=TRUE)
Results: t = 6.477, df = 38, p-value = 1.266e-07
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: 6.276 11.984

T-test of means of medium dose and high dose
Code: t.test(doseHigh$len, doseMedium$len, paired=FALSE, var.equal=TRUE)
Results: t = 4.901, df = 38, p-value = 1.811e-05
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: 3.736 8.994

T.test of means of low dose and high dose
Code: t.test(doseHigh$len, doseLow$len, paired=FALSE, var.equal=TRUE)
Results: t = 11.8, df = 38, p-value = 2.838e-14
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:12.84 18.15

(4)Conclusion

Null Hypothesis is rejected.

For all T-test, there is less than 0.01% that the difference of means of the 2 groups compared to be 0.

PART B: Comparing Tooth Growth by Delivery Method

(1)&(2) Preliminary Analysis & Summary Analysis of Delivery Method vs Length of Teeth

```
#plot(ToothGrowth$supp, ToothGrowth$len);
suppOrangeJuice <- subset(ToothGrowth, supp=="OJ"); suppAscorbicAcid <- subset(ToothGrowth,
supp=="VC")
#Standard Deviation Orange Juice, Ascorbic Acid
paste(sd(suppOrangeJuice$len), sd(suppAscorbicAcid$len), sep="     ")
```

```
## [1] "6.60556104972236    8.26602866466464"
```

```
# Mean for Ascorbic Acid and Orange Juice
paste(mean(suppAscorbicAcid$len), mean(suppOrangeJuice$len), sep="   ")
```

```
## [1] "16.9633333333333   20.6633333333333"
```

(3)Confidence Level and Hyposthesis

H0 Null Hypothesis: The differences in the means is 0

HA ALternative Hypothesis: THe differences in the means is not equal to 0

T-test of means of Delivery via Orange Juice and Ascorbic Acid

Code: t.test(suppOrangeJuice$len, suppAscorbicAcid$len, paired=FALSE, var.equal=FALSE)

$conf.t.test(suppOrangeJuicelen, suppAscorbicAcid$len, paired=FALSE, var.equal=TRUE)

Results: t = 1.915, df = 58, p-value = 0.06039

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval: -0.167 7.567

(4)Conclusion

Null Hypothesis is rejected.

For each T-test, there is approximately 6% probability that the difference of means of the 2 groups compared to be 0.