Assignment 4 - 0679576, Graham Eckel

1a)

```
library(MASS)
set.seed(2019-11-13)
dir = "C:\\Users\\...\\Applied Regression Analysis\\Assignment 4\\"
file1 = "s3240_F19_viscosity.csv"
dfVisc = read.table(file=paste(dir,file1, sep=""), header=TRUE, sep=',')

Viscosity = dfVisc$visc
Temperature = dfVisc$temp

slrVisc = lm(Viscosity~Temperature)
summary(slrVisc)
```

```
Call:
lm(formula = Viscosity ~ Temperature)

Residuals:
      Min        1Q    Median        3Q       Max
-0.040322 -0.036061 -0.009551  0.020046  0.068487

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.2832642  0.0460644   27.86 1.42e-07 ***
Temperature -0.0087852  0.0007158  -12.27 1.78e-05 ***
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Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.04659 on 6 degrees of freedom
Multiple R-squared:  0.9617,    Adjusted R-squared:  0.9553
F-statistic: 150.6 on 1 and 6 DF,  p-value: 1.782e-05
```
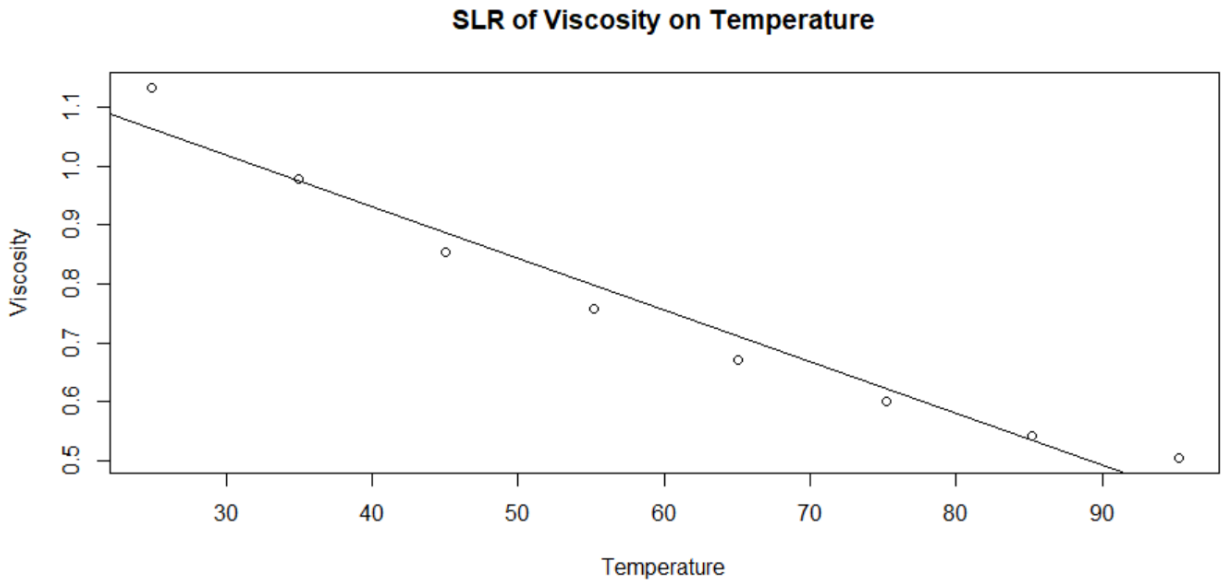
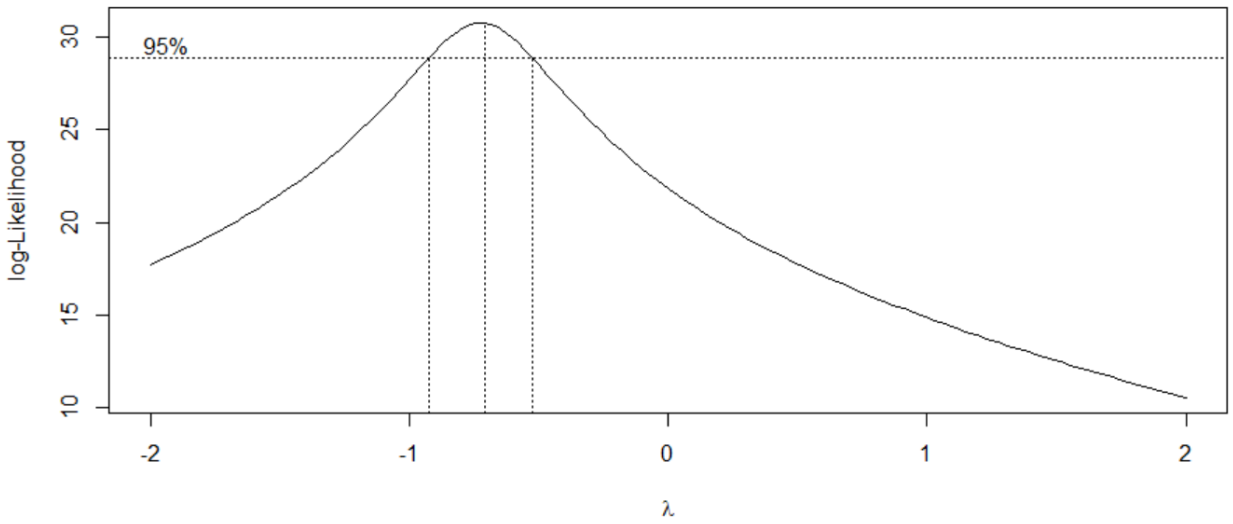



b)
test = boxcox(slrVisc, lambda = seq(-2,2,0.05))
test$x[which.max(test$y)] # = -0.70 (close to -0.5?)



The approximate confidence interval for lambda = -0.707 with an approximate lower bound of -0.925 and an upper bound of -0.51.

Generally, if your lambda is close to a simple transformation value, ie. 0.01 is close to 0, you could take the simple transformation of lambda being equal to zero. Our lambda value of -0.707 is nearly in the middle of -1 and -0.5, the reciprocal log and square root so we could use either of these values. But, since -0.707 is roughly between these values, we can simply keep this value as is and transform y as such: (y^(-0.707) -1)/-0.707.

c)

```
dfVisc$viscXlambda = (((dfVisc$visc^-0.707)-1)/-0.707)
LambdaViscosity = dfVisc$viscXlambda
slrLVisc = lm(LambdaViscosity~Temperature)

plot(Temperature, LambdaViscosity, ylab = "Transformed Viscosity", xlab = "Temperature", main
= "SLR of Transformed Viscosity on Temperature")
abline(slrLVisc)
```