|  |  |  |  |
| --- | --- | --- | --- |
| DNSC 6313-10 Statistics for Analytics II | Lab 3 | GWlogoBlue | Student ID**:**  **G****27279521** |

**(This assignment is to be completed individually. While you may interact with others to gain mastery of the generic course content, all work associated with this assignment must be strictly and exclusively yours, including creating the R code and determining the correct answers/completing the template; the only collaboration permitted is with the instructor.)**

The American Automobile Association (AAA) wishes to identify the effect of increasing (or decreasing) gasoline prices on demand for automobile gasoline in the Washington, DC, metropolitan area. On each of a randomly selected set of days across a highly volatile period, the average price of a gallon of gasoline (Price, in dollars) on that day and the average number of gallons sold per gasoline station (Demand, in gallons) on that day in the Washington, DC, metropolitan area were recorded. The data are recorded in the file AAA.dat, which includes a header record. Based on these data, and using the framework described in class, please use R (and ***only*** R) to complete the following template. ***Unless otherwise noted, all results should be accurate to at least 4 decimal places.*** Use an  level of .05:

1. Using a linear model, what is the interpretation of the slope parameter? (Use the actual b1 estimate here.) -1770.12. From linear model, There will be intercept(b0) and slope(b1). slope of the model was -1770.12 while the intercept was 9666.81. it means that demand = -1770.12 \* price + 9666.81. It can be described by one unit of price increase, the demand will decrease by unit of -1770.12.
2. Using a Log-Lin model, what is the interpretation of the slope parameter? (Use the actual b1 estimate here.)? -39.92882 is the slope of Log-Lin Model, If price inceases by one unit, demand would be expected to change by -39.92882 percent.
3. Using a Log-Log model, what is the interpretation of the slope parameter? (Use the actual b1 estimate here.) -1.775692 is the slope of the Log-Log Model. If 1 percent of price increases, demand will be changed by -1.775692 percent.
4. Which of these three models would you expect to provide the best model for predicting the relationship between price and demand?  Why? I think, it is Log-Log Model because Through Linear Model, Log-Lin Model, Log-Log model, Log-Log Model had the highest value for multiple R squared which was 0.9989 while Linear Model had 0.9873 and Log Lin Model had 0.9974.
5. If the price of gasoline is $3.00 per gallon, what is the expected demand (in gallons) under a linear model? 4356.45
6. If the price of gasoline is $3.00 per gallon, what is the expected demand (in gallons) under a Log-Lin model? 4425.603647
7. If the price of gasoline is $3.00 per gallon, what is the expected demand (in gallons) under a Log-Log model? 4480.002807

Paste your full R script immediately below this line:

# Lab 3

head(AAA)

tail(AAA)

# Q1

aaa.lm <- lm(Demand~Price, data = AAA)

summary(aaa.lm)

# Q2

AAA["LnDemand"] <- log(AAA$Demand)

AAA.lm <-lm(LnDemand~Price, data = AAA)

summary(AAA.lm)

# For all Dx \* b1: %Dy = 100(eDx\*b1-1)

100\*((exp(-0.50964)-1))

# Q3

AAA["LnPrice"] <- log(AAA$Price)

AAAln.lm <- lm(LnDemand~LnPrice, data = AAA)

summary(AAAln.lm)

# Q4

summary(aaa.lm) # linear : Multiple R-squared: 0.9873

summary(AAA.lm) # Log Lin : Multiple R-squared: 0.9974

summary(AAAln.lm) # Log Log : Multiple R-squared: 0.9989

# Q5

summary(aaa.lm)

9666.81 - (1770.12\*3)

# [1] 4356.45

# Q6

InquiryPrice <- 3

lnPredict <- predict(AAA.lm, data.frame(Price = InquiryPrice))

Predict <- exp(lnPredict)

c(3,lnPredict,Predict)

# 3.000000 8.395162 4425.603647

# Q7

lnInquiryPrice <- log(3)

lnPredict <- predict(AAAln.lm, data.frame(LnPrice = lnInquiryPrice))

Predict <- exp(lnPredict)

c(3,lnInquiryPrice,lnPredict,Predict)

# 3.000000 1.098612 8.407379 4480.002807