BLACKBOARDUSERNAM - Homework 4

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Please read all instructions carefully. Replace the capital letters above with your blackboard username. To allow this file to be knit, you might need to save it in a new location, as you do not have write permissions in the dropbox folder, and R does not work well with chinese characters. Do not comment out the lines that produce output. Check your html file before submission to ensure it has all relevant output. Ensure all answers are your own words and your own work. Do not delete anything below these instructions. Thank you!

Question 1A:

```
#INSERT CODE HERE
df <- read.csv("C:\\Users\\92998\\Downloads\\Homework4_Data.csv")
#df
brand_3 <- subset(df,brand==3)
#brand_3
```

Question 1B:

```
#INSERT CODE HERE
thisLM <- lm(log(units)~isFeature+price,data = brand_3)
summary(thisLM)
```

```
##
## Call:
## lm(formula = log(units) ~ isFeature + price, data = brand_3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.2496 -0.4503  0.0267  0.4659  3.2719
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)   10.34582    0.07128  145.14   <2e-16 ***
## isFeatureTRUE  0.73671    0.02065   35.67   <2e-16 ***
## price         -0.98240    0.02437  -40.31   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6893 on 9646 degrees of freedom
## Multiple R-squared:  0.3164, Adjusted R-squared:  0.3162
## F-statistic:  2232 on 2 and 9646 DF,  p-value: < 2.2e-16
```

Question 1C:

```
#INSERT CODE HERE
possiblePrices = data.frame(price = seq(0,10,.01),isFeature =
FALSE)
```

Question 1D:

```
#INSERT CODE HERE
possiblePrices$Prediction <- exp(predict(thisLM, newdata = possiblePrices))
#possiblePrices
```

Question 1E:

```
#INSERT CODE HERE
possiblePrices$profitMargin <- possiblePrices$price - mean(brand_3$marginalCost)
#possiblePrices
```

Question 1F:

```
#INSERT CODE HERE
possiblePrices$Profit<-possiblePrices$Prediction * possiblePrices$profitMargin
#possiblePrices
```

Question 1G:

```
#INSERT CODE HERE
optPrice <- possiblePrices$price[which.max(possiblePrices$Profit)]
optProfit <- possiblePrices$Profit[which.max(possiblePrices$Profit)]

optprediction <-possiblePrices$Prediction[which.max(possiblePrices$Profit)]

optPrice
```

```
## [1] 2.94
```

```
optProfit
```

```
## [1] 1763.495
```

```
optprediction
```

```
## [1] 1732.941
```

```
#Keep 'optPrice' here so we can see your optimal price
optPrice
```

```
## [1] 2.94
```

Question 1H:

```
#INSERT CODE HERE
Omitted_lm <- lm(log(units)~price,data = brand_3)
summary(Omitted_lm)
```

```
##
## Call:
## lm(formula = log(units) ~ price, data = brand_3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.3253 -0.4895  0.0030  0.4671  3.2268
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 11.33707    0.06983  162.35   <2e-16 ***
## price       -1.28858    0.02426  -53.11   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7333 on 9647 degrees of freedom
## Multiple R-squared:  0.2262, Adjusted R-squared:  0.2261
## F-statistic:  2821 on 1 and 9647 DF,  p-value: < 2.2e-16
```

```
possiblePrices2 = data.frame(price = seq(0,10,.01),isFeature =
FALSE)
#possiblePrices2
possiblePrices2$Prediction <- exp(predict(Omitted_lm, newdata = possiblePrices2))
#possiblePrices2
possiblePrices2$profitMargin <- possiblePrices2$price - mean(brand_3$marginalCost)
#possiblePrices2

possiblePrices2$Profit<-possiblePrices2$Prediction * possiblePrices2$profitMargin
#possiblePrices2

optPirce2 <- possiblePrices2$price[which.max(possiblePrices2$Profit)]
optPirce2
```

```
## [1] 2.7
```

```
optProfit2 <- possiblePrices2$Profit[which.max(possiblePrices2$Profit)]
optProfit2
```

```
## [1] 2011.033
```

```
optprediction2 <-possiblePrices2$Prediction[which.max(possiblePrices2$Profit)]

optprediction2
```

```
## [1] 2586.1
```

```
#Keep 'optPrice' here so we can see your optimal price
optPrice
```

```
## [1] 2.94
```

Question 1l:

```
#INSERT CODE HERE
Interaction_lm <- lm(log(units)~isFeature*price,data = brand_3)
summary(Interaction_lm)
```

```
##
## Call:
## lm(formula = log(units) ~ isFeature * price, data = brand_3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.2672 -0.4366  0.0286  0.4655  3.2326
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)          9.71684    0.08659  112.21   <2e-16 ***
## isFeatureTRUE        2.48213    0.14021   17.70   <2e-16 ***
## price               -0.76612    0.02966  -25.83   <2e-16 ***
## isFeatureTRUE:price -0.64407    0.05118  -12.58   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6838 on 9645 degrees of freedom
## Multiple R-squared:  0.3274, Adjusted R-squared:  0.3272
## F-statistic:  1565 on 3 and 9645 DF,  p-value: < 2.2e-16
```

```
possiblePrices3 = data.frame(price = seq(0,10,.01),isFeature =
TRUE)
possiblePrices3$Prediction <- exp(predict(Interaction_lm, newdata = possiblePrices3))
#possiblePrices3
possiblePrices3$profitMargin <- possiblePrices3$price - mean(brand_3$marginalCost)
#possiblePrices3

possiblePrices3$Profit<-possiblePrices3$Prediction * possiblePrices3$profitMargin
#possiblePrices3

optPirce3 <- possiblePrices3$price[which.max(possiblePrices3$Profit)]
optPirce3
```

```
## [1] 2.63
```

```
optProfit3 <- possiblePrices3$Profit[which.max(possiblePrices3$Profit)]
optProfit3
```

```
## [1] 3443.759
```

```
#Keep 'optPrice' here so we can see your optimal price
optPrice
```

```
## [1] 2.94
```

Question 2A: 60 WORDS MAX. SUBMIT WRITTEN ANSWER VIA IN THE BLACKBOARD SUBMISSION LINK.

Question 2B: 60 WORDS MAX. SUBMIT WRITTEN ANSWER VIA IN THE BLACKBOARD SUBMISSION LINK.

Question 2C: 60 WORDS MAX. SUBMIT WRITTEN ANSWER VIA IN THE BLACKBOARD SUBMISSION LINK.