SafeBabies

#Required libraries:

```
library(ISLR)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(ggplot2)
```

#Data segregation:

```
SafeBabies <- Carseats %>% select("Sales", "Price", "ShelveLoc")

head(SafeBabies)
```

```
##   Sales Price ShelveLoc
## 1  9.50   120       Bad
## 2 11.22    83      Good
## 3 10.06    80    Medium
## 4  7.40    97    Medium
## 5  4.15   128       Bad
## 6 10.81    72       Bad
```

```
BadSeats <- filter(SafeBabies, ShelveLoc == 'Bad')

GoodSeats <- filter(SafeBabies, ShelveLoc == 'Good')
```

#Model to find b0 & b1 values for the respective two locations:

Why?

Total Profit = Sales * (Price - Production Cost)

Total Profit = (-b1 * Price + b0) * (Price - Production Cost)

By regression we can find values of b0 & b1.

The we can convert Total Profit into a quadratioc equation to find Price by performing derivative of the equation.

```
Model_BadSeats <- lm(Sales ~ Price, data = BadSeats)

Model_GoodSeats <- lm(Sales ~ Price, data = GoodSeats)
```

#Finding Profit by substituting values:

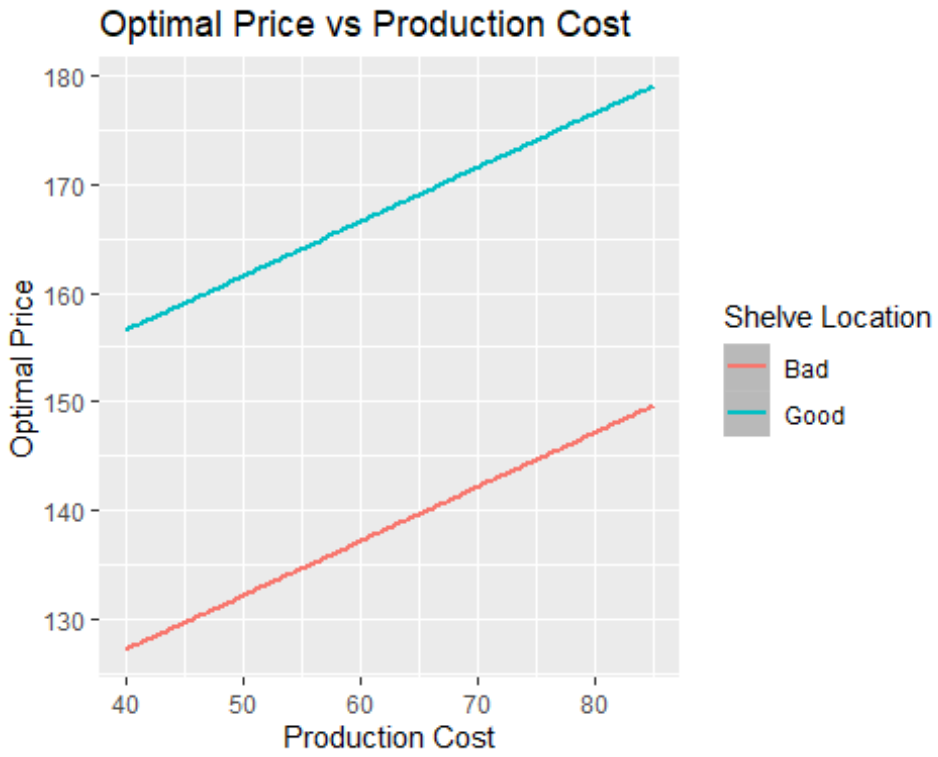
```
Equation_GoodSeats <- expression(-0.065785*P^2 + 17.968864*P*55 +
(17.968864)*P +55*0.065785)
Derivative_Price_GoodSeats <- D(Equation_GoodSeats,'P')
Price_GoodSeats <- (-0.065785 *55 - 17.968864)/(2 * -0.065785)
Price_GoodSeats

## [1] 164.0727

Equation_BadSeats <- expression(-0.055220*P^2 + 11.832984*P*55 +
(11.832984)*P +55*0.055220)
Derivative_Price_BadSeats <- D(Equation_BadSeats,'P')
Price_BadSeats <- (-0.055220 *55 - 11.832984)/(2 * -0.055220)
Price_BadSeats

## [1] 134.644
```

#Finding for the cost range 40 - 85:

```
c <- 40:85
Optimal_GoodSeats <- numeric(length=length(c))
for (i in seq_along(c)){
   Optimal_GoodSeats[i] <- (-0.065785 *c[i] - 17.968864)/(2 * -0.065785)
}



c <- 40:85
Optimal_BadSeats <- numeric(length=length(c))
for (i in seq_along(c)){
   Optimal_BadSeats[i] <- (-0.055220 *c[i] - 11.832984)/(2 * -0.055220)
}
```

#Plotting:

```
Pricing <- data.frame(Optimal_GoodSeats, Optimal_BadSeats)

ggplot(Pricing) +
geom_smooth(aes(x = c, y = Optimal_GoodSeats, color = "Good"), method =
"loess") +
geom_smooth(aes(x = c, y = Optimal_BadSeats, color = "Bad"), method =
"loess") +
labs(x = "Production Cost", y = "Optimal Price", title = "Optimal Price vs
Production Cost", color = "Shelve Location")
```


Optimal Price vs Production Cost
Optimal Price
180
170
160
150
140
130
40
50
60
70
80
Production Cost
Shelve Location
Bad
Good