Lab 1

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Loading Data

```
knitr::opts_chunk$set(echo = TRUE)

## Set working directory

setwd('/Users/abhi/Documents/UW/Courses/Winter Quarter 17/INFX 573/Week_2/Lab_1
/')

## Loading the data

seatbelts <- read.csv('seatbelts.csv')

head(seatbelts)
```

```
##   year.month year DriversKilled drivers front rear   kms PetrolPrice
## 1   1969.000 1969           107    1687   867  269  9059   0.1029718
## 2   1969.083 1969            97    1508   825  265  7685   0.1023630
## 3   1969.167 1969           102    1507   806  319  9963   0.1020625
## 4   1969.250 1969            87    1385   814  407 10955   0.1008733
## 5   1969.333 1969           119    1632   991  454 11823   0.1010197
## 6   1969.417 1969           106    1511   945  427 12391   0.1005812
##   VanKilled law
## 1        12   0
## 2         6   0
## 3        12   0
## 4         8   0
## 5        10   0
## 6        13   0
```

```
## Get information on data

dim(seatbelts)
```

```
## [1] 192  10
```

```
colnames(seatbelts)
```

```
##  [1] "year.month"    "year"          "DriversKilled" "drivers"
##  [5] "front"         "rear"          "kms"           "PetrolPrice"
##  [9] "VanKilled"     "law"
```

Summary

```
summary(seatbelts)
```

```
##    year.month        year      DriversKilled      drivers
##  Min.   :1969   Min.   :1969   Min.   : 60.0   Min.   :1057
##  1st Qu.:1973   1st Qu.:1973   1st Qu.:104.8   1st Qu.:1462
##  Median :1977   Median :1977   Median :118.5   Median :1631
##  Mean   :1977   Mean   :1977   Mean   :122.8   Mean   :1670
##  3rd Qu.:1981   3rd Qu.:1981   3rd Qu.:138.0   3rd Qu.:1851
##  Max.   :1985   Max.   :1985   Max.   :198.0   Max.   :2654
##      front             rear            kms         PetrolPrice
##  Min.   : 426.0   Min.   :224.0   Min.   : 7685   Min.   :0.08118
##  1st Qu.: 715.5   1st Qu.:344.8   1st Qu.:12685   1st Qu.:0.09258
##  Median : 828.5   Median :401.5   Median :14987   Median :0.10448
##  Mean   : 837.2   Mean   :401.2   Mean   :14994   Mean   :0.10362
##  3rd Qu.: 950.8   3rd Qu.:456.2   3rd Qu.:17202   3rd Qu.:0.11406
##  Max.   :1299.0   Max.   :646.0   Max.   :21626   Max.   :0.13303
##    VanKilled           law
##  Min.   : 2.000   Min.   :0.0000
##  1st Qu.: 6.000   1st Qu.:0.0000
##  Median : 8.000   Median :0.0000
##  Mean   : 9.057   Mean   :0.1198
##  3rd Qu.:12.000   3rd Qu.:0.0000
##  Max.   :17.000   Max.   :1.0000
```

Calculating Averages

```
mean(seatbelts[,"DriversKilled"])
```

```
## [1] 122.8021
```

```
mean(seatbelts[seatbelts[,"year"] >= 1969 &
                   seatbelts[,"year"]<1970,"DriversKilled"])
```

```
## [1] 103
```

```
by(seatbelts[,"DriversKilled"], seatbelts[,"year"], mean)
```

```
## seatbelts[, "year"]: 1969
## [1] 103
## ------------------------------------------------------------
## seatbelts[, "year"]: 1970
## [1] 122.4167
## ------------------------------------------------------------
## seatbelts[, "year"]: 1971
## [1] 140.0833
## ------------------------------------------------------------
## seatbelts[, "year"]: 1972
## [1] 145.0833
## ------------------------------------------------------------
## seatbelts[, "year"]: 1973
## [1] 144.3333
## ------------------------------------------------------------
## seatbelts[, "year"]: 1974
## [1] 132
## ------------------------------------------------------------
## seatbelts[, "year"]: 1975
## [1] 125.75
## ------------------------------------------------------------
## seatbelts[, "year"]: 1976
## [1] 120.9167
## ------------------------------------------------------------
## seatbelts[, "year"]: 1977
## [1] 116.25
## ------------------------------------------------------------
## seatbelts[, "year"]: 1978
## [1] 125.5833
## ------------------------------------------------------------
## seatbelts[, "year"]: 1979
## [1] 125.4167
## ------------------------------------------------------------
## seatbelts[, "year"]: 1980
## [1] 117.8333
## ------------------------------------------------------------
## seatbelts[, "year"]: 1981
## [1] 110.5
## ------------------------------------------------------------
## seatbelts[, "year"]: 1982
## [1] 118.6667
## ------------------------------------------------------------
## seatbelts[, "year"]: 1983
## [1] 114.25
## ------------------------------------------------------------
## seatbelts[, "year"]: 1984
```

```
## [1] 95.25
## ------------------------------------------------------------
## seatbelts[, "year"]: 1985
## [1] 118
```

Fatalities by year 1970 and 1978

```
mean(subset(seatbelts$DriversKilled, seatbelts$year == 1970))
```

```
## [1] 122.4167
```

```
mean(subset(seatbelts$DriversKilled, seatbelts$year == 1978))
```

```
## [1] 125.5833
```

Rear seat fatalities by year 1972 and 1980

```
mean(subset(seatbelts$rear, seatbelts$year == 1972))
```

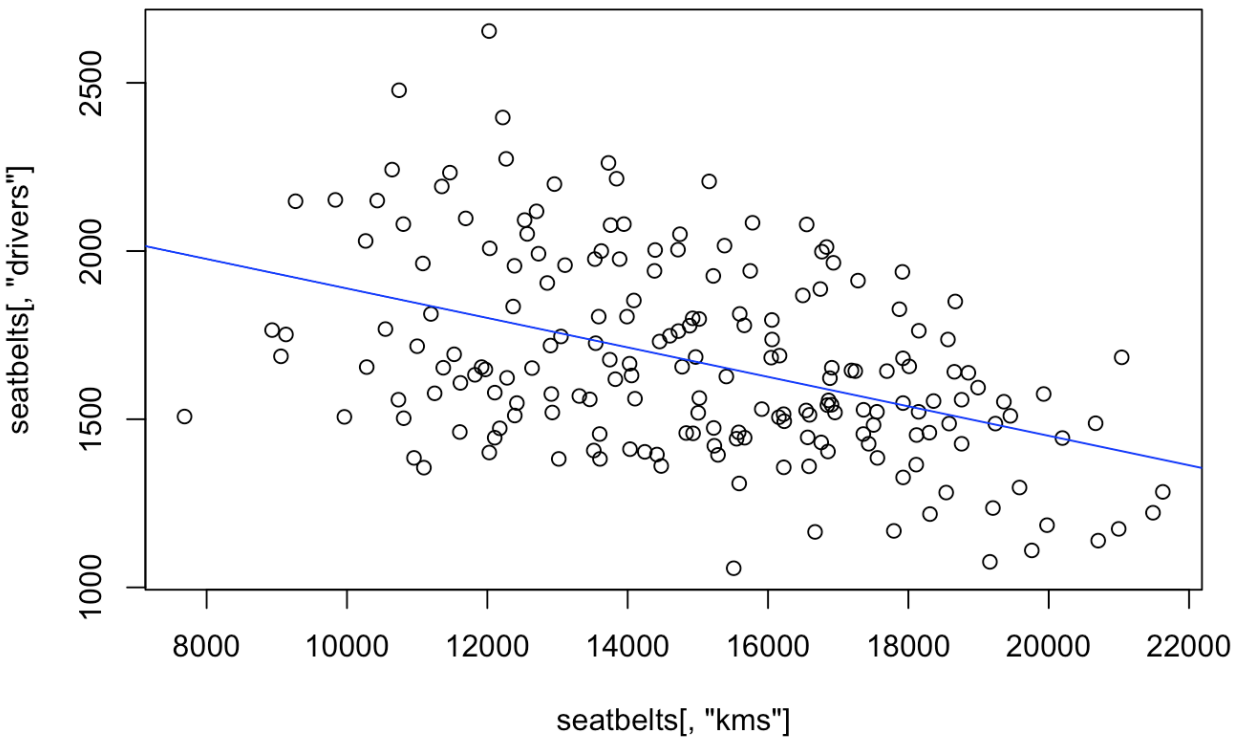
```
## [1] 440.25
```

```
mean(subset(seatbelts$rear, seatbelts$year == 1980))
```

```
## [1] 380.8333
```

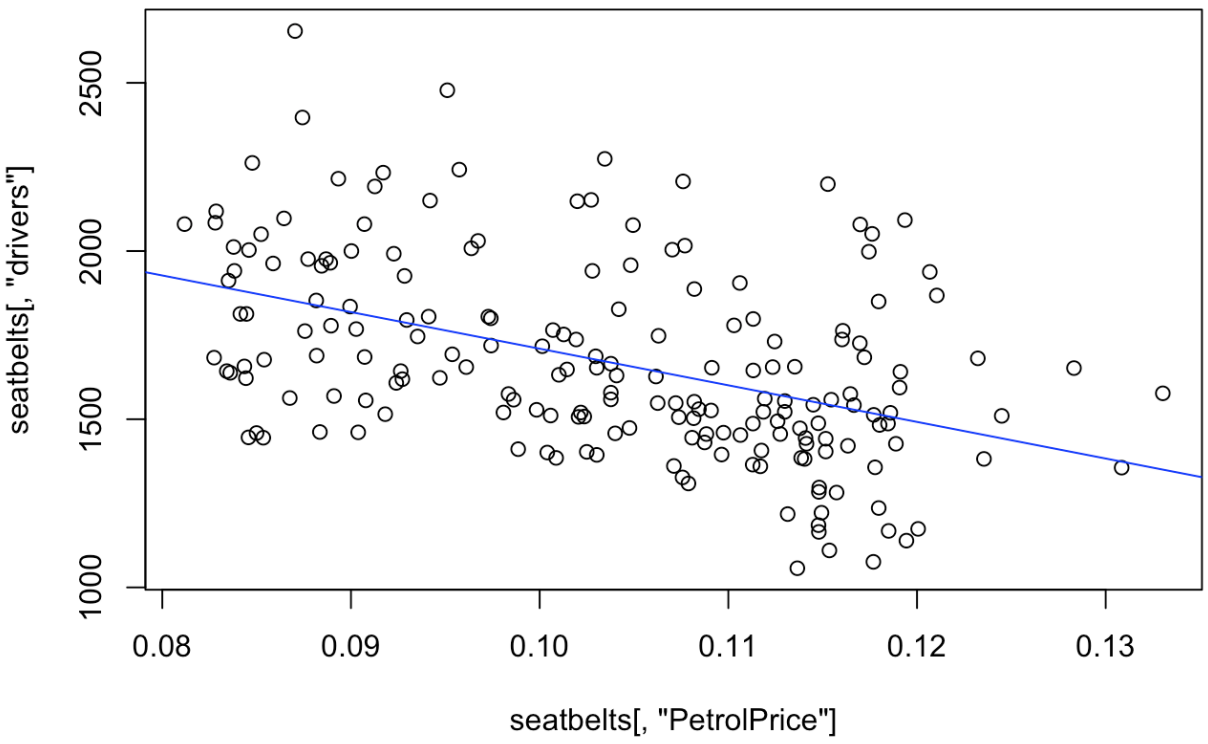
Exploring Relationships I

```
plot(seatbelts[,"kms"], seatbelts[,"drivers"])
abline(lm(seatbelts$drivers ~ seatbelts$kms), col = "blue")
```



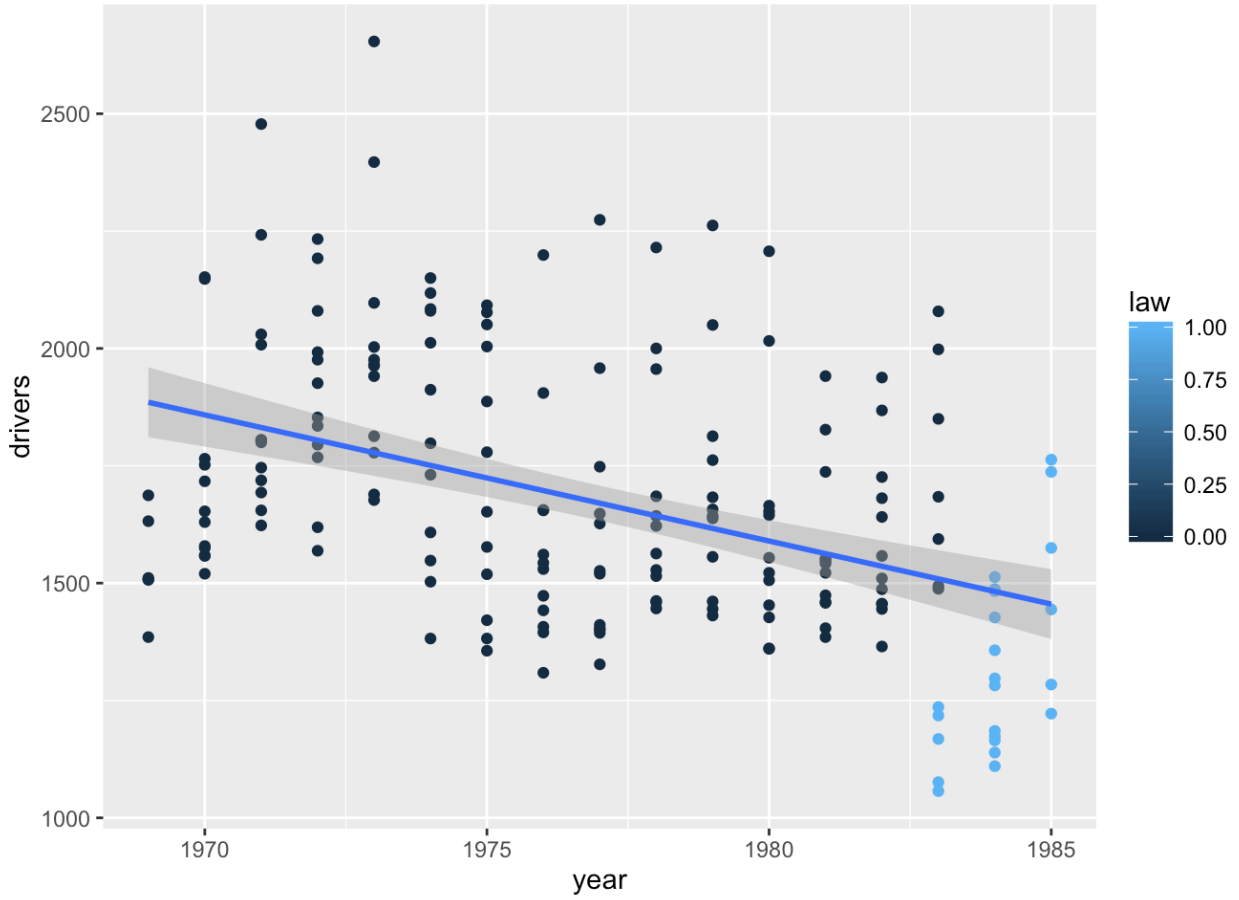
We can see that the fatalities for drivers decreases as the distance traveled increases as well as when the petrol price rises

```
plot(seatbelts[,"PetrolPrice"], seatbelts[,"drivers"])
abline(lm(seatbelts$drivers ~ seatbelts$PetrolPrice), col = "blue")
```



Exploring Relationships II

```
library(ggplot2)
p <- ggplot(seatbelts, aes(year,drivers, color = law)) + geom_point()
p + geom_smooth(method = 'lm', formula = y~x)
```

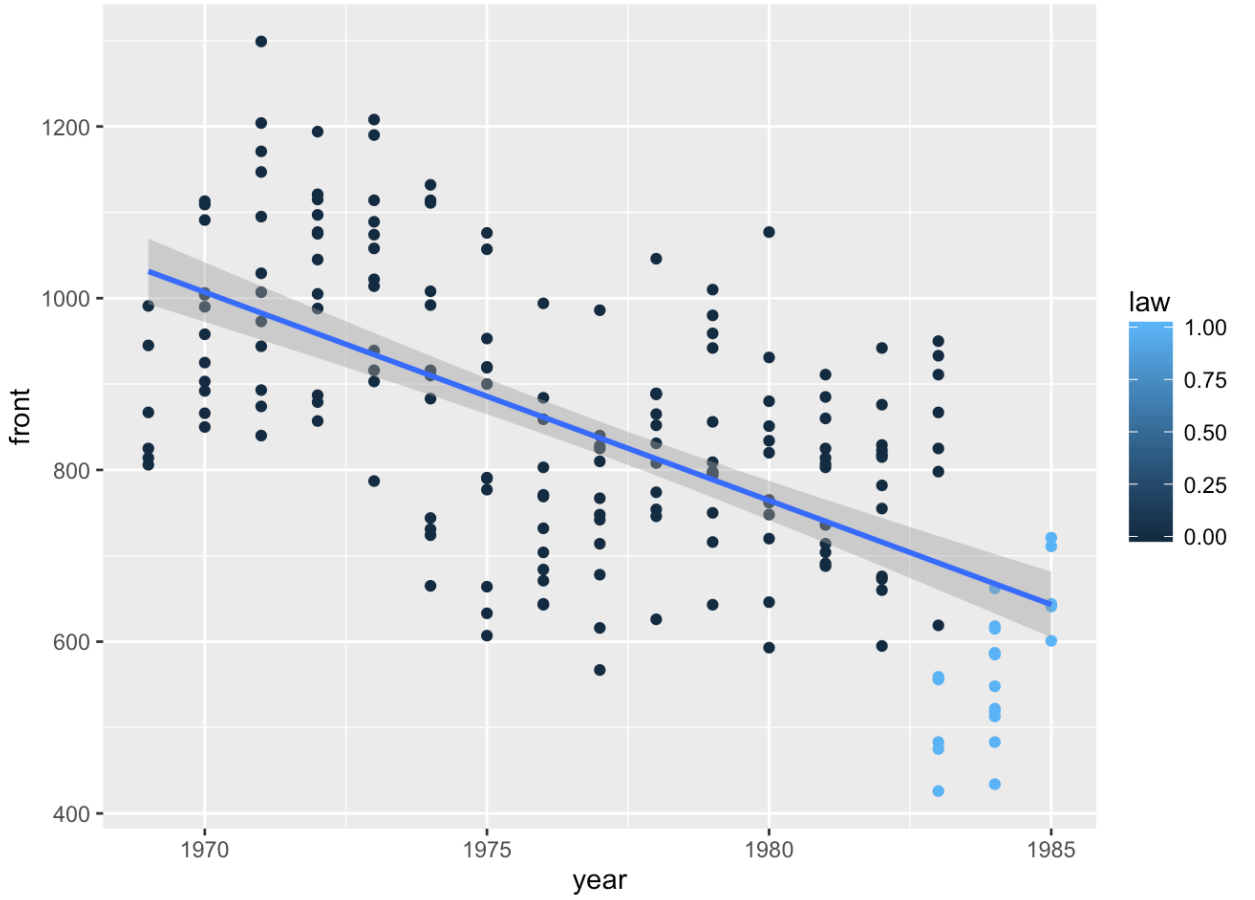


We can observe that the number of fatalities has decreased drastically after the seatbelt was passed. There is a sharp decline

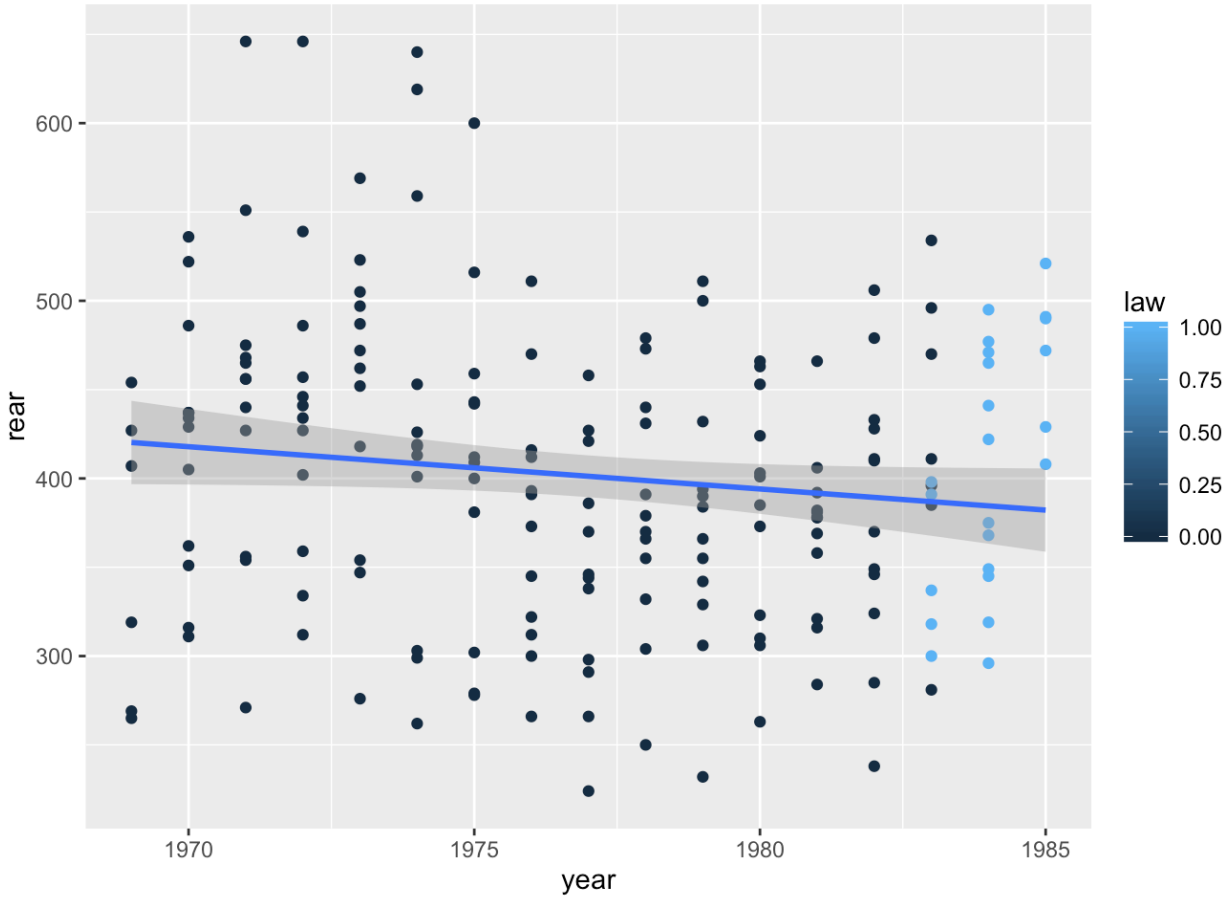
Extra Credit Exploration

```
library(ggplot2)
p <- ggplot(seatbelts, aes(year,VanKilled, color = law)) + geom_point() + facet
_grid(.~law)

g <- ggplot(seatbelts, aes(year,front, color = law)) + geom_point() + geom_smoo
th(method = 'lm', formula = y ~ x )
g
```




```
h <- ggplot(seatbelts, aes(year,rear, color = law)) + geom_point() + geom_smoot
h(method = 'lm', formula = y ~ x )
h
```



We can see from the above two plots that as the law was passed there was a steep decrease in the number of front seat riders fatalities. However, the seat belt law didn't make it mandatory for rear seat riders to wear seat belts and relatively the number of rear seat fatalities decreased very minutely even after the seat belt law was passed. Which shows that there is a possibility that if met with an accident front seat riders could avoid major fatality due to the mandate over rear seat drivers.