# Assignment 06

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### Set the working directory to the root of your DSC 520 directory

### Load the `data/r4ds/heights.csv` to

```
setwd("/Users/feliperodriguez/Library/CloudStorage/OneDrive-BellevueUniversity/Github/dsc520")
heights_df <- read.csv("data/r4ds/heights.csv")
```

### Load the ggplot2 library

```
library(ggplot2)
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
```

### Fit a linear model using the `age` variable as the predictor and `earn` as the outcome

```
age_lm <- lm(earn ~ age, data=heights_df)
```

### View the summary of your model using `summary()`

```
summary(age_lm)
```

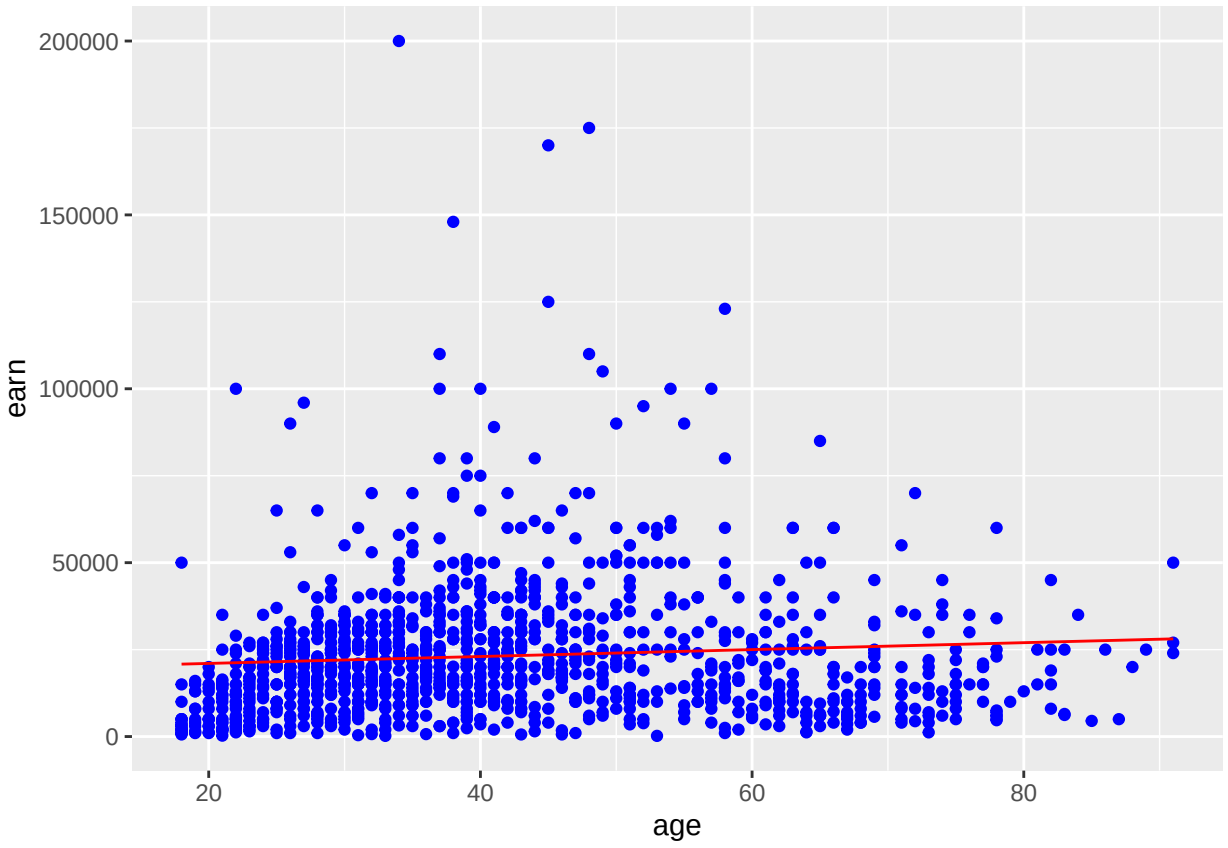
```
##
## Call:
## lm(formula = earn ~ age, data = heights_df)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -25098 -12622  -3667   6883 177579
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 19041.53    1571.26  12.119  < 2e-16 ***
## age            99.41      35.46   2.804  0.00514 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 19420 on 1190 degrees of freedom
## Multiple R-squared:  0.006561,   Adjusted R-squared:  0.005727
## F-statistic:  7.86 on 1 and 1190 DF,  p-value: 0.005137
```

### Creating predictions using `predict()`

```
age_predict_df <- data.frame(earn = predict(age_lm, heights_df), age=heights_df$age)
```

### Plot the predictions against the original data

```
ggplot(data = heights_df, aes(y = earn, x = age)) +
  geom_point(color='blue') +
  geom_line(color='red',data = age_predict_df, aes(y= earn, x= age))
```




```
mean_earn <- mean(heights_df$earn)
```

### Corrected Sum of Squares Total

```
sst <- sum((mean_earn - heights_df$earn)^2)
```

### Corrected Sum of Squares for Model

```
ssm <- sum((mean_earn - age_predict_df$earn)^2)
```

### Residuals

```
residuals <- heights_df$earn - age_predict_df$earn
```

### Sum of Squares for Error

```
sse <- sum(residuals^2)
```

### R Squared: R2 = SSM  SST

```
r_squared <- ssm/sst
```

### Number of observations

```
n <- nrow(heights_df)
```

### Number of regression parameters

```
p <- 2
```

### Corrected Degrees of Freedom for Model (p-1)

```
dfm <- p-1
```

### Degrees of Freedom for Error (n-p)

```
dfe <- n-p
```

### Corrected Degrees of Freedom Total: DFT = n - 1

```
dft <- n - 1
```

### Mean of Squares for Model: MSM = SSM / DFM

```
msm <- ssm/dfm
```

### Mean of Squares for Error: MSE = SSE / DFE

```
mse <- sse/dfe
```

### Mean of Squares Total: MST = SST / DFT

```
mst <- sst/dft
```

### F Statistic: F = MSM/MSE

```
f_score <- mse/mse
```

### Adjusted R Squared: R2 = 1 - (1 - R2)(n - 1) / (n - p)

```
adjusted_r_squared <- 1 - (1 - r_squared) * (n-1) / (n - p)
```

### Calculate the p-value from the F distribution

```
p_value <- pf(f_score, dfm, dft, lower.tail=F)
```