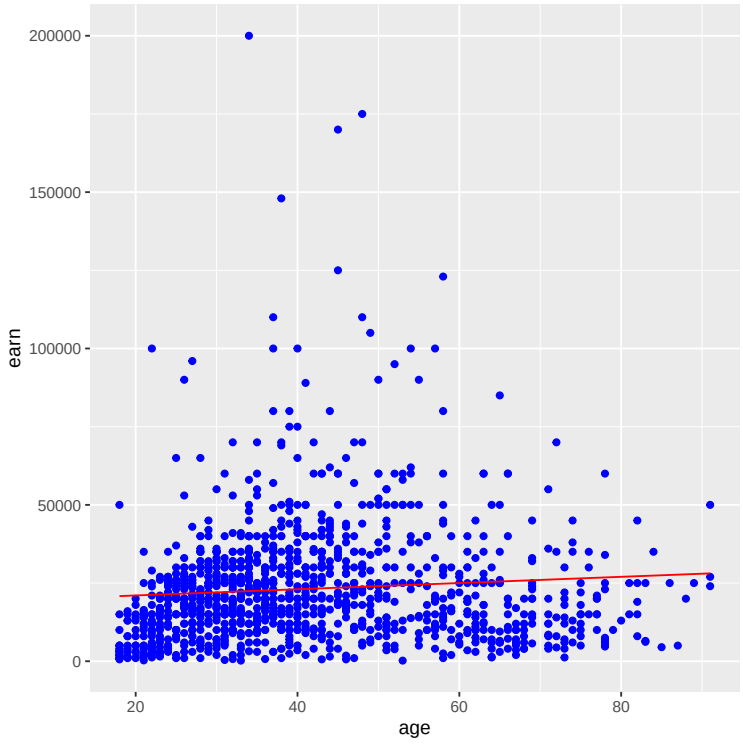
July 25, 2023

The results below are generated from an R script.

```r
# Assignment: ASSIGNMENT 6
# Name: Rogers, Bryan
# Date: 2023-07-25

## Set the working directory to the root of your DSC 520 directory
setwd("/Users/bryansmacbookpro/Desktop/R")

## Load the `data/r4ds/heights.csv` to
heights_df <- read.csv("heights.csv")

## Load the ggplot2 library
library(ggplot2)

## 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, data = 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))
```




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

```
## [1] 23154.77
```

```r
## 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 R^2 = SSM\SST
r_squared <- ssm/sst
r_squared
```

```
## [1] 0.006561482
```

```r
## Number of observations
n <- nobs(age_lm)
## 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
```

```r
## 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 <- msm/mse

## Adjusted R Squared R2 = 1 - (1 - R2)(n - 1) / (n - p)
adjusted_r_squared <- 1 - (1 - r_squared) * (n - 1) / (n - p)
adjusted_r_squared

## [1] 0.005726659

## Calculate the p-value from the F distribution
p_value <- pf(f_score, dfm, dft, lower.tail=F)
```

The R session information (including the OS info, R version and all packages used):

```r
sessionInfo()

## R version 4.1.2 (2021-11-01)
## Platform: x86_64-apple-darwin17.0 (64-bit)
## Running under: macOS 13.4.1
##
## Matrix products: default
## LAPACK: /Library/Frameworks/R.framework/Versions/4.1/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] ggplot2_3.4.2
##
## loaded via a namespace (and not attached):
##  [1] rstudioapi_0.14  knitr_1.43       magrittr_2.0.3   tidyselect_1.2.0 munsell_0.5.0
##  [6] colorspace_2.1-0 R6_2.5.1         rlang_1.1.1      fansi_1.0.4      highr_0.10
## [11] dplyr_1.1.2      tools_4.1.2      grid_4.1.2       gtable_0.3.3     xfun_0.39
## [16] tinytex_0.45     utf8_1.2.3       cli_3.6.1        withr_2.5.0      tibble_3.2.1
## [21] lifecycle_1.0.3  farver_2.1.1     vctrs_0.6.3      glue_1.6.2       evaluate_0.21
## [26] labeling_0.4.2   compiler_4.1.2   pillar_1.9.0     generics_0.1.3   scales_1.2.1
## [31] pkgconfig_2.0.3

Sys.time()

## [1] "2023-07-25 12:57:48 EDT"
```