> # Assignment: WEEK 6 - EXERCISE 10

> # Name: Jena, Binay

> # Date: 2020-10-08

>

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

> setwd("C:/Users/binay/Documents/GitHub/dsc520")

>

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

> heights\_df <- read.csv("data/r4ds/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

> age\_lm

Call:

lm(formula = earn ~ age, data = heights\_df)

Coefficients:

(Intercept) age

19041.53 99.41

>

> ## 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))

>

> ggsave("C:/Users/binay/Documents/GitHub/dsc520/completed/assignment06/plots/regression-plot-JenaBinay.png")

Saving 5.6 x 4.97 in image

>

> mean\_earn <- mean(heights\_df$earn)

> mean\_earn

[1] 23154.77

> ## Corrected Sum of Squares Total

> sst <- sum((mean\_earn - heights\_df$earn)^2)

> sst

[1] 451591883937

> ## Corrected Sum of Squares for Model

> ssm <- sum((mean\_earn - age\_predict\_df$earn)^2)

> ssm

[1] 2963111900

> ## Residuals

> residuals <- heights\_df$earn - age\_predict\_df$earn

> residuals

[1] 26485.21417 35192.93914 8075.70651 21912.54868 28081.64879

[6] -12626.07618 5087.59108 8385.80839 -19129.04732 5373.92382

[11] -18972.90126 7578.67765 -9725.48195 -12111.22046 -520.72812

[16] -7807.06086 18075.70651 20584.61994 -17508.84355 30479.27188

[21] -19111.22046 -7129.04732 -15728.45309 16882.83725 10485.21417

[26] -12520.72812 1994.12760 27181.05456 18678.08342 -6526.67041

[31] 2678.08342 52081.64879 4876.89496 -9626.07618 -19295.17629

[36] 7876.89496 -3707.65509 5373.92382 -22502.90126 2976.30074

[41] 882.83725 10075.70651 -12023.69926 -10129.04732 -3522.51081

[46] -1924.29349 -17330.83001 -11608.24932 -502.90126 -2117.16275

[51] 10087.59108 -19502.90126 -4824.88772 12777.48919 -16830.83001

[56] -10508.84355 -14707.65509 3075.70651 -5725.48195 -5824.88772

[61] -6815.97429 -21801.11858 -20370.62623 -918.35121 -24110.03201

[66] 4274.51805 -18629.04732 -5918.35121 -13228.45309 -13801.11858

[71] -13713.59738 -15701.71280 -7918.35121 -20518.35121 7777.48919

[76] 7678.08342 -12818.94544 -16626.07618 -13304.08972 -5105.27818

[81] -2620.13389 -1327.85887 -19829.64155 -21522.51081 -1725.48195

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[91] 34695.91028 -7602.30703 -6281.91658 -7023.69926 -11327.85887

[96] 9684.02571 -4023.69926 -7719.53966 -228.45309 -2315.97429

[101] 14280.46034 14584.61994 -6315.97429 9976.30074 2692.93914

[106] -6915.38006 2479.27188 3684.02571 -16824.88772 47181.05456

[111] -18017.75698 -16427.26464 -1626.07618 -17129.04732 37479.27188

[116] -17123.10504 7181.05456 47479.27188 26882.83725 21081.64879

[121] 6684.02571 -13017.75698 -216.56852 19795.31605 -7123.10504

[126] -22099.33589 -5123.10504 7777.48919 5476.30074 -20212.52435

[131] -6608.24932 19584.61994 8584.61994 -14608.24932 36485.21417

[136] -3011.81469 -18828.45309 -20824.88772 5274.51805 -15224.88772

[141] -7315.97429 68373.92382 -15216.56852 -2222.51081 -5830.83001

[146] -13005.87240 385.80839 -2918.35121 -4614.19161 -13912.40892

[151] 17578.67765 -403.49549 3572.73536 2777.48919 -6105.27818

[156] 20186.99685 -8912.40892 -5620.13389 -608.24932 280.46034

[161] -13397.55320 41385.80839 -18304.08972 14695.91028 -8315.97429

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[181] -15204.68395 12081.64879 -7818.94544 -10918.35121 -17801.11858

[186] -16011.81469 10988.18531 20888.77954 -6228.45309 -11695.77052

[191] -111.22046 2777.48919 590.56222 -1824.88772 2572.73536

[196] 20385.80839 46181.05456 38584.61994 9777.48919 -2321.91658

[201] 9479.27188 988.18531 146485.21417 12678.08342 17181.05456

[206] 10976.30074 -3228.45309 6684.02571 3876.89496 -16129.04732

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[216] -14918.35121 15888.77954 16882.83725 10328.67765 -5900.52435

[221] 13081.64879 -19403.49549 -10421.32235 34695.91028 16584.61994

[226] 20181.05456 22578.67765 -16918.35121 -19192.79937 -2918.35121

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[236] 12976.30074 4678.08342 -21605.27818 19280.46034 -1924.29349

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[891] -22713.59738 9678.08342 -19430.23578 -18327.85887 11783.43148

[896] 46186.99685 -824.88772 29169.16999 -6129.04732 -13520.72812

[901] -11526.67041 6286.40262 -5129.04732 -4111.22046 75590.56222

[906] -13315.97429 9695.91028 -15123.10504 -13725.48195 -13011.81469

[911] 1286.40262 1485.21417 6186.99685 25578.67765 -6614.19161

[916] 4572.73536 -15105.27818 35689.96799 75.70651 -21092.20515

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[936] 7280.46034 777.48919 -5801.11858 -8192.79937 -5602.30703

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[966] -17427.26464 6373.92382 -11228.45309 -18228.45309 -9129.04732

[971] -4514.78583 13081.64879 -17906.46663 12578.67765 16684.02571

[976] -6526.67041 -15315.97429 491.15645 5181.05456 -520.72812

[981] 72.73536 -18327.85887 1175.11228 -8298.14743 -6099.33589

[986] -7614.19161 -6626.07618 30777.48919 4274.51805 -17824.88772

[991] -14906.46663 18888.77954 -5321.91658 -18818.94544 26186.99685

[996] 30888.77954 4882.83725 -18813.00315 -5912.40892 -4204.68395

[ reached getOption("max.print") -- omitted 192 entries ]

> ## Sum of Squares for Error

> sse <- sum(residuals^2)

> sse

[1] 448628772037

> ## R Squared R^2 = SSM\SST

> r\_squared <- ssm/sst

> r\_squared

[1] 0.006561482

>

> ## Number of observations

> n <- nrow(age\_predict\_df)

> n

[1] 1192

> ## Number of regression parameters

> p <- 2

> p

[1] 2

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

> dfm <- p-1

> dfm

[1] 1

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

> dfe <- n-p

> dfe

[1] 1190

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

> dft <- n-1

> dft

[1] 1191

>

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

> msm <- ssm/dfm

> msm

[1] 2963111900

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

> mse <- sse/dfe

> mse

[1] 376998968

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

> mst <- sst/dft

> mst

[1] 379170348

> ## F Statistic F = MSM/MSE

> f\_score <- msm/mse

> f\_score

[1] 7.859735

>

> ## 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)

> p\_value

[1] 0.005136826