Lab 4

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# Part 1

From the linear solver built into R, we can see that there is a positive, strong correlation between the neck girth and weight of the bear (due to the very small p-value we can see that the correlation is strong). For every inch in neck girth, we can estimate about 20 pounds of weight added to the bear, given some minimum weight we expect the bear to have. The intercept doesn’t seem to make sense as it is a negative value, and the bear cannot have a negative weight.

When calculating the p-value by hand we can see that the value agrees with the linear solver. Our p-value is to the order of 10^-49, which is much smaller than 10^-16 as indicated in the summary. This p-value being small shows a strong correlation between weight and neck size.

# Part 2

Again, we can see that our calculated p-values agree with the linear solver. However, while the neck girth still has high correlation (low p-value) with the weight, the head width seems to be fairly independent of the weight as indicated by the higher p-value.

CODE

# Part 1

> TSS - (RSS1 + SS\_reg)

[1] -6.984919e-09

> var\_error

[1] 15.4955592 0.7148337

> t

[,1]

[1,] -15.79733

[2,] 28.80384

> pvalue

[,1]

[1,] 1.433795e-28

[2,] 2.475672e-49

> summary(lm\_neck)

Call:

lm(formula = bear$Weight ~ bear$Neck.G)

Residuals:

Min 1Q Median 3Q Max

-97.011 -19.446 -3.831 15.644 168.594

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -244.7885 15.4956 -15.8 <2e-16 \*\*\*

bear$Neck.G 20.5900 0.7148 28.8 <2e-16 \*\*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 37.01 on 97 degrees of freedom

Multiple R-squared: 0.8953, Adjusted R-squared: 0.8942

F-statistic: 829.7 on 1 and 97 DF, p-value: < 2.2e-16

# Part 2

> TSS - (RSS1 + SS\_reg)

[1] -7.683411e-09

> var\_error

[1] 17.471073 1.208252 4.503687

> t

[,1]

[1,] -13.8922970

[2,] 17.2482028

[3,] -0.2568191

> pvalue

[,1]

[1,] 8.435318e-25

[2,] 2.614679e-31

[3,] 7.978623e-01

> summary(lm\_multi)

Call:

lm(formula = bear$Weight ~ bear$Neck.G + bear$Head.W)

Residuals:

Min 1Q Median 3Q Max

-96.572 -19.677 -4.368 16.749 169.096

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -242.713 17.562 -13.821 <2e-16 \*\*\*

bear$Neck.G 20.840 1.215 17.159 <2e-16 \*\*\*

bear$Head.W -1.157 4.527 -0.255 0.799

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 37.19 on 96 degrees of freedom

Multiple R-squared: 0.8954, Adjusted R-squared: 0.8932

F-statistic: 410.9 on 2 and 96 DF, p-value: < 2.2e-16