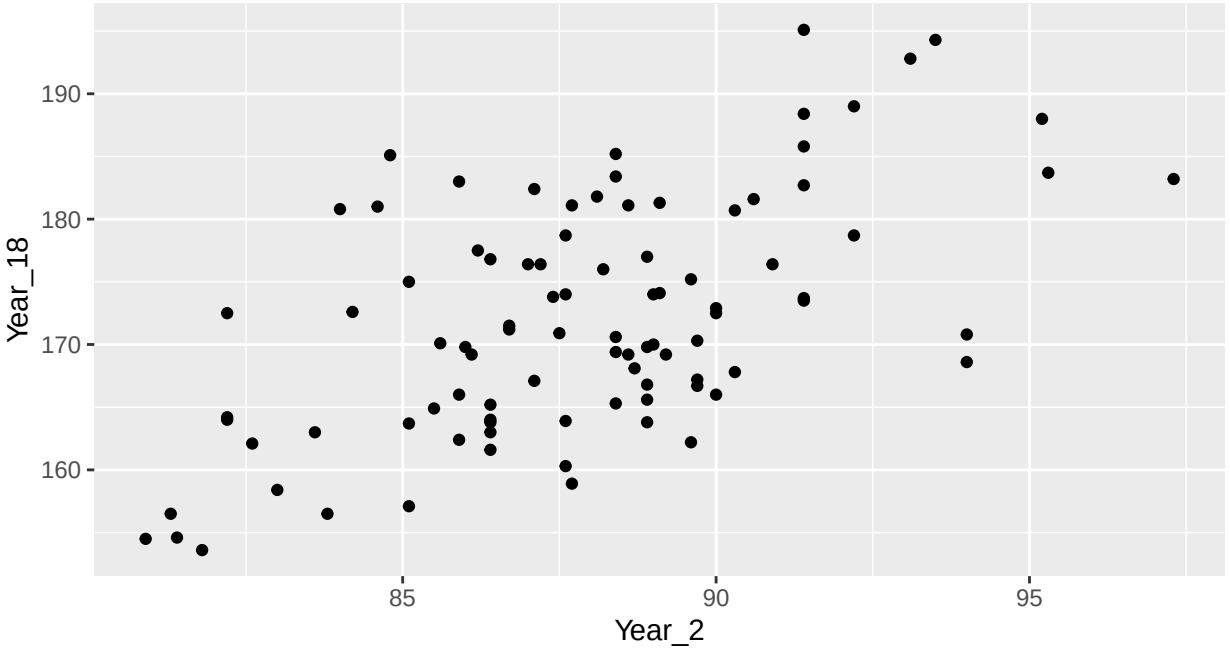
Stat 204 Final Exam Due 5/4/20

1. As part of a growth study conducted by researchers at the University of California, Berkeley, the heights of boys and girls were recorded at various times between the ages of 1 and 18 years; the heights were recorded in centimeters and are available in the book's **HeightData** dataset. Here is a scatterplot of the heights at age 18 versus the heights at age 2 :



Here is the output from a linear regression based on this data:

```
##
## Call:
## lm(formula = Year_18 ~ Year_2, data = HeightData)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -13.6608  -5.6256  -0.7221   5.7769  18.1344
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  25.9830    21.4475   1.211    0.229
## Year_2        1.6625     0.2438   6.819 9.81e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 7.685 on 91 degrees of freedom
## Multiple R-squared:  0.3382, Adjusted R-squared:  0.3309
## F-statistic:  46.5 on 1 and 91 DF,  p-value: 9.805e-10
```

a. What is the regression equation for predicting height at age 18 from height at age 2?

b. What is the slope? What does it tell us?

c. What is the intercept? What does it tell us?

d. One kid was 3 centimeters taller than another at age 2. What is our best guess for the difference between their heights at age 18?

e. Use the information in the table to determine a 95% confidence interval for the slope.

f. What are the t-score and corresponding p-value for testing the hypothesis of no relationship between these two variables? How do they relate to your confidence interval?

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2. Do exercises **D.2**, **D.4**, and **D.6** from the book's **Unit D: Essential Synthesis** ; this section follows chapter 10, and these exercises are on page 659 of the book if you happen to have your book with you. For each of these exercises, state the relevant hypotheses carefully, show all of the calculations for the appropriate test, and state your conclusion as plainly as you can.