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 MAT 222
 Spring 2019
 Quiz 7

“My name’s Richard Grayson, but all the kids at the orphanage call me Dick.’
 ‘Well, children can be cruel.’”
 –Richard Grayson & Bruce Wayne,
 LEGO Batman

Problem 1: An instructor is trying to predict student’s uncurved MAT 222 final grades from their MAT 221 final grade. They perform a regression analysis, the results of which are (partially) found below.

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	<u>1</u>	189.77	<u>189.77</u>	11.71	0.004
Error	<u>15</u>	<u>243.18</u>	16.21		
Total	16	432.94			

Model Summary

S	R-sq	R-sq (adj)
<u>4.02638</u>	<u>43.8%</u>	40.1%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value
Constant	2.143	<u>3.336</u>	0.64	0.530
221 GRADE	0.6873	0.2009	<u>3.42</u>	0.004

The regression equation is

$$222 \text{ GRADE} = \underline{2.143 + 0.6873 \cdot 221 \text{ GRADE}}$$

- (a) Complete the missing entries in the table above.
- (b) How many students were used to create this model? 17
- (c) According to this model, are 221 and 222 grades positively or negatively correlated or neither?
positively correlated
- (d) Explain why the p -value for the F -value and the p -value for the t -value for the coefficient ‘221 GRADE’ are the same.

The F -test tests whether all the β_i are 0. But there is only one variable for this model, β_1 , 221 GRADE. Therefore, the F -test is testing $H_0 : \beta_1 = 0$ versus $H_a : \beta_1 \neq 0$ while the t -test for 221 GRADE tests $H_0 : \beta_1 = 0$ versus $H_a : \beta_1 \neq 0$. Therefore, the p -values should be the same.