STAT 3008
Exercises 6

Problems refer to the problem sets in the textbook: Applied Linear Regression, 3rd edition by Weisberg.

1. Fill in the missing values in the following tables of regression output.

ANOVA Table					
Source	Sum of Squares	d.f.	Mean Square	F-statistics	p-value
Regression	1848.76				
Residuals					
Total					

Coefficient Table				
Variable	Coefficient	s.e.	t-statistics	p-value
Constant	-23.4325	12.74		0.0824
X		0.1528	8.32	
n=?	R^2=?	$\hat{\sigma}$ =?		

2. Let $Y = (29, 34, 19, 41, 36, 36, 24, 10)'$, $X1 = (1, 1, 3, 3, 5, 5, 7, 7)'$, $X2 = (10, 7, 6, 3, 2, -1, -2, -5)'$, $X3 = (2, 6, 0, 9, 7, 9, 4, 2)'$.

   i Compare the regression model $Y = \beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + e$ and $Y = \beta_0 + \beta_2 X2 + e$ using a F-test. Which model will you use?

   ii Test whether $\beta_1 = \beta_2$, i.e. both variables produce the same effect. (Hint: rewrite the model as

$$Y = \beta_0 + \beta_1(X1 + X2) + \beta_2 X2 + \beta_3 X3 + e \tag{1}$$

   and do a t-test.)

   ii Do a F-test to compare between model (1) and

$$Y = \beta_0 + \beta_1(X1 + X2) + \beta_3 X3 + e \tag{2}$$

   Show numerically the F-statistic is equal to the square of the t-statistic.