Name: _____

MAT 222
Spring 2019
Minitab Lab 3

The following exercises make use of the `abalone.mpj` file. This data is from a study by Dr. Sam Waugh's Ph.D. thesis at the University of Tasmania. The goal of the study was to study whether one could predict the age of abalone using physical measurements. The variables in the study were sex (male, female, and infant), length (mm), diameter (mm), height (mm), whole weight (g), shucked weight (g), viscera weight (g), shell weight (g), and rings (each ring is 1.5 years). Use Minitab to complete the following exercises.

Problem 1: Find a 5-number summary for the variable 'Whole Weight'. Fill in the data below.

Min	Q_1	Median	Q_3	Max

We will now sort the abalone into categories called 'small', 'medium', and 'large'. Assume that the 5-number summary above is a good representative of the weight distribution of all abalone. We will call an abalone small if its weight is less than Q_1, medium if its weight is between Q_1 and Q_3, and large if its weight is larger than Q_3. One can count individuals meeting certain conditions in Minitab. Under `Calc` → `Calculator`, choose `Logical` under `Functions`. Entering `IF('Sex' = "M" And 'Whole Weight' >= 5 And 'Whole Weight' <= 6,1,0)`, Minitab enters a '1' if the abalone is male and has whole weight ≥ 5 and ≤ 6. One can then enter these results into a blank column, and then using `Calc` → `Column Statistics`, find the sum of this new column. The sum will be the number of male abalone with weight between 5 and 6.

Problem 2: Use Minitab to complete the following chart of abalone broken down by categories male, female, or infant and small, medium, or large.

Size \ Sex	Male	Female	Infant	Totals
Small				
Medium				
Large				
Totals				

Problem 3: Enter the table from Problem 2 into Minitab and use Minitab to perform a χ^2-test. [Use $\alpha = 0.05$.] For this test, fill in the expected values and the χ^2-squared contribution in the tables below. Then state the null and alternative hypothesis for the test along with its degrees of freedom and p-value. Be sure to state the conclusion for this test.

Expected Values

Size \ Sex	Male	Female	Infant
Small			
Medium			
Large			

χ^2-squared Contributions

Size \ Sex	Male	Female	Infant
Small			
Medium			
Large			

$$\begin{cases} H_0 : \\ \\ H_a : \end{cases}$$

$X^2 =$

degrees of freedom=

p-value=

Problem 4: Use `Stat` → `Regression` → `Fit Regression Model` to create a multilinear regression to predict the variable 'Whole Weight' using the variables 'Length', 'Diameter', 'Height', and 'Rings'. Provide a print of the regression analysis. Be sure to also give the regression equation.

Problem 5: Is the model statistically significant? Explain.

Problem 6: For this regression, which variables are statistically significant? Which variables are not statistically significant? For the variables which are *not* statistically significant, how might you tell from their coefficient that it is not statistically significant?