Math 113: Classroom Activity 9 Name : _____
10 pts

Instructions:

Is your pulse rate related to your blood pressure? Use a blood pressure monitor to find your blood pressure and pulse rates.

1. Record your blood pressure, and pulse rate in the table.

Systolic Blood Pressure	Diastolic Blood Pressure	Pulse Rate

Give your information to the instructor who will enter it into Minitab and make a file available for the class to use.

2. Each group may be asked to work with a different set of predictor (x) and response (y) variables. Circle the appropriate variables for your group.

Our predictor variable, *x*, is (systolic pressure / diastolic pressure / pulse rate).

Our response variable, *y*, is (systolic pressure / diastolic pressure / pulse rate).

3. Generate a scatter plot of the response (y) and predictor (x) variables. Based on only the scatter plot, try to estimate the value of the correlation coefficient.

Estimate of correlation coefficient, r = _____

4. Summarize the data. Circle the variable names so it is clear what you are describing.

	Predictor Variable	**Response Variable**
variable	systolic / diastolic / pulse	systolic / diastolic / pulse
sample size		
mean		
st. dev		
variance		

5. Perform correlation between your two variables to find the actual value for the correlation coefficient, r. The correlation output will give you two numbers, a correlation coefficient and a probability value.

   Calculated correlation coefficient, r = _____

   Probability value, p-value = _____

6. Perform correlation again, but this time switch the order of the two variables. Record the correlation coefficient and p-value.

   Calculated correlation coefficient, r = _____

   Probability value, p-value = _____

   What can you conclude about the order of the variables when finding correlation?

7. Use Minitab to perform Regression on your two variables. Pay careful attention to which variable is the response variable and which is the predictor variable.

   Write the regression equation given by the computer.

8. Copy down the ANOVA table from the regression. Notice the order of the first two columns is reversed.

Source	SS	DF	MS	F	P
Regression (explained)					
Residual (unexplained)					
Total					

9. Divide the total SS by the total DF and write that in the total MS cell.

Here is an explanation of ANOVA table.

Source The source of the variation/variance. The Regression row is due to the regression equation and represents the part that can be explained by the model. The Residual row represents the part that can not be explained. The Residual source is sometimes called the Error.

SS Sum of Squares of the deviations from the mean. Also known as variation.

DF Degrees of Freedom. The df(Regression) is one less than the number of parameters being estimated. In this problem, there are 2 parameters, the slope and the y-intercept, so there is only one df for the Regression source. The df(Residual) is the sample size minus the number of parameters. The df(Total) is one less than the total sample size.

MS Mean of the Squared deviation. This is found by dividing the variation (SS) by degrees of freedom (df) and is also known as the variance.

F Test statistic for the null hypothesis $H_0 : \beta_1 = 0$ (the slope of the regression line is zero, meaning there is no significant linear correlation).

P Probability-value corresponding to the test statistic F.

10. Answer the following questions based on the SS column from the ANOVA table.

    a. How much is the explained variation?

    b. How much is the total variation?

    c. Find the coefficient of determination, r^2, by dividing the explained variation by the total variation.

    d. Find *r* by taking the square root of the coefficient of determination.

    e. Compare the result of part d to the correlation coefficient found in question 5. Ignoring that *r* might be negative, the results (do / do not) agree.

    f. How does the MS(total) compare to the variance of the response found in question 4?

11. How does the p-value from the ANOVA table compare with the p-value from the correlation in question 5?

12. The formula for the slope of the regression equation is $b_1 = r\frac{s_y}{s_x}$ where s_y is the standard deviation for the response variable and s_x is the standard deviations for the predictor variable.

    a. Take the value of *r* from question 5 and multiply it by the appropriate standard deviations found in question 4 to find the slope.

    b. How does the slope found in part a. compare to the slope found in question 7.