Math 113: Classroom Activity 10          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 rate.

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 names of your variables.

|  | **Predictor Variable - x** | **Response Variable - y** |
|---|---|---|
| **variable** | systolic / diastolic / pulse | systolic / diastolic / pulse |
| **sample size** |  |  |
| **mean** | $\overline{x} =$ | $\overline{y} =$ |
| **st. dev** | $s_x =$ | $s_y =$ |
| **variance** | $s_x^2 =$ | $s_y^2 =$ |

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.  Find the slope of the regression equation, $b_1 = r\dfrac{s_y}{s_x}$.

8.  The regression line always passes through the centroid $(\overline{x}, \overline{y})$ and has the equation $\hat{y} = b_0 + b_1 x$. Use the centroid and the slope found in question 7 to find the y-intercept, $b_0$.

9.  Write the equation of the regression line. Replace the $\hat{y}$ and $x$ by the variable names.

10. 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.

11. How does the regression equation found by hand compare with the regression equation generated by Minitab?

12. 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 | | | | | |

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

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

    a. Find the coefficient of determination by using the formula
    $$r^2 = \frac{SS(Regression)}{SS(Total)}$$

    b. How does the value of $r^2$ compare with the square of the correlation coefficient, $r$, that you found in question 5.

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

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