STAT 415/615 ( PRACTICE MIDTERM)

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| X | 221 | 400 | 300 | 400 | 200 | 260 | 300 | 375 | 210 | 400 | 200 | 344 |
| Y | 33 | 42 | 37 | 53 | 22 | 37 | 40 | 42 | 25 | 52 | 30 | 42 |

Part 1

1. Use and show R code to produce a scatter plot for the bivariate data given above. Indicate if the scatter plot is showing a definitive positive or negative trend for the data.
2. Use and show R code to produce a linear model for the bivariate data shown above (use the lm method). Interpret the slope of your model.
3. Use and show R code to determine how much of the variation in Y is explained by your model.
4. Find a 95% confidence interval for the slope of your model.
5. Find the specific residual for the data point (400,42). Does the residual indicate that the observed value of 400 is above or below average. Explain why or why not.
6. Use and show R code to find all of the residuals of your model.
7. Use and show R code to produce the residual plot. (Residuals versus Fitted Values) Does the Residual Plot suggest a good linear fit for your model? Explain why or why not.
8. Use and show R code that produces a boxplot of your residuals. Does your boxplot indicate the existence of outliers.
9. Use and show R code to determine the normality status of your residuals.
10. Find the value that estimates the variance of the population linear model. (Use may use R)
11. Execute an F test in order to determine if a linear model is appropriate.   
    Use the steps and procedure illustrated in class by making use of an   
    ANOVA table, the F value, and the F critical number. And of course,   
    indicate if the null hypothesis should be rejected.
12. Now use matrix methods to find b0 and b1. Write the regression model and compare your results to the answer for part b above.

Part 2

Table

Description automatically generated

a. Prepare a scatter plot of the data. Does a linear relation appear to be appropriate.

b. Use the Box-Cox procedure to find an appropriate power transformation of Y. What transformation of Y is suggested? Be sure to show all work and R code as demonstrated in class.