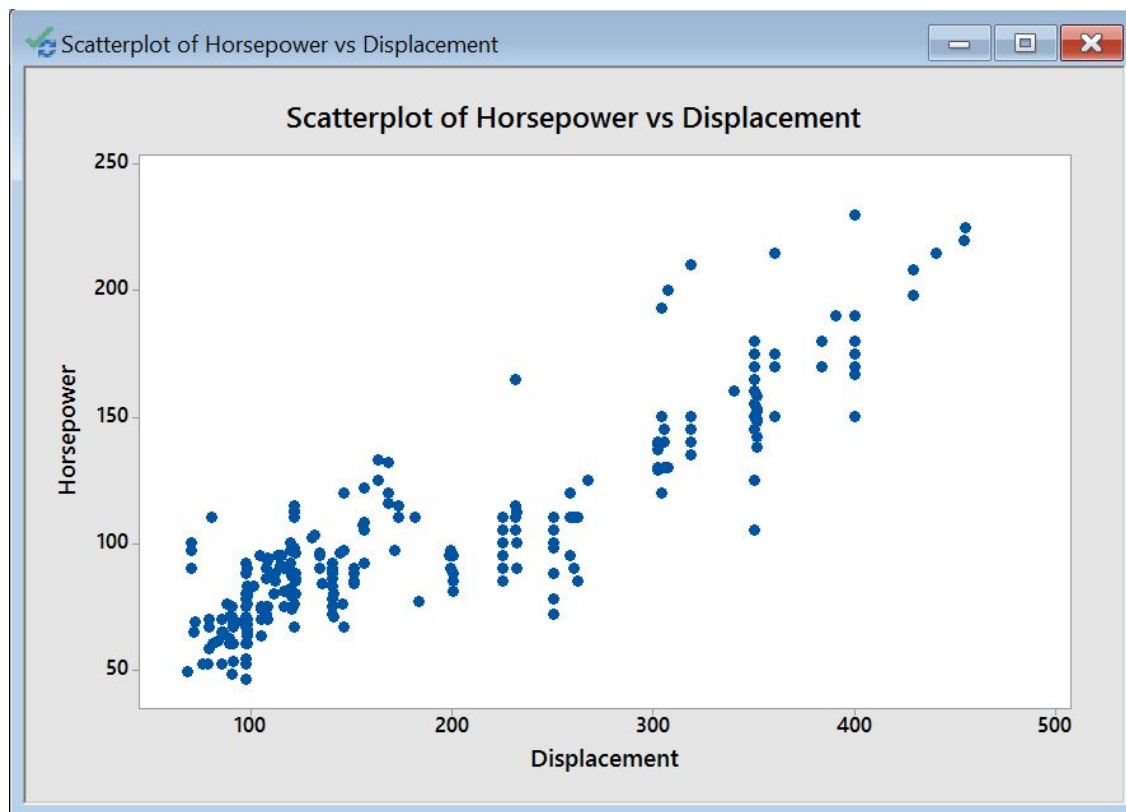


Name: ...Bryan Quinn.

This quiz is due in the MyCourses dropbox by 5pm next Friday. This is not a group assignment! **Show work to 4 decimal places.**

1.) A researcher is interested in trying to estimate the horsepower output of various automobile engines based on the displacement of the engine in cubic inches. 398 cars were randomly selected and the datafile REGautoMPG.MTW contains the results of that sampling. Use the information in that file to construct a **scatterplot** of the relationship between the displacement and horsepower. What does this plot tell you about this relationship? Based on your observations would it seem like a good idea to perform a regression analysis? Explain.

Based on the scatterplot that was generated by the sample data, it appears that the relationship between these two measurements is positive. Although you would not get a perfect fit line, I think it would be a good idea to perform a linear regression on this data.



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2.) The table below was produced using the same information from problem 1. Use this table to calculate the correlation between the displacement and the output of the engines. What does this correlation tell you about the relationship between the variables.

**Descriptive Statistics: Displacement, Horsepower, Product**

| Variable     | Total Count | Sum      | Sum of Squares |
|--------------|-------------|----------|----------------|
| Displacement | 398         | 76983.50 | 19206864.25    |
| Horsepower   | 398         | 40952.00 | 4857524.00     |
| Product      | 398         | 9374647  | 4.07963E+11    |

$$r = \frac{(398)(9374647) - (76983.5)(40952)}{\sqrt{(398)(19206864.25) - (76983.5)^2} * \sqrt{(398)(4857524) - (40952)^2}}$$

$$r = 0.897$$

3.) The regression equation provided below can be used to estimate the output of an engine based on its displacement.

Regression Equation

$$\text{Horsepower} = 40.31 + 0.33004 \text{ Displacement}$$

Give an interpretation including units for the y-intercept and slope of the equation. Do both of these values make sense in the context of the problem? Explain fully.

Use this equation to estimate the output of an engine that has a 238 cubic inch displacement, if possible.

For the most part these value make sense given the context. If displacement is positively correlated with horsepower, then it makes sense that increasing the displacement by one cubic meter, would increase the horsepower by 0.33004. However, it does not make sense that an engine with 0 cubic meters would still have 40.31 horsepower.

$$\text{Horsepower} = 40.31 + 0.33004 (40.31) = 53.6139 \text{ horsepower}$$

Explain why it would not be appropriate to use this model to estimate the horsepower output for the SmartCar with a displacement of 36.5532 cubic inches (599cc)

No, it would not make sense because an engine of that size is below the size of the engines that were used in our sample data.