

Pledge:

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Dr. Lunsford

MATH 171
Quiz 2

Name: Solution
100 Points Possible

Problem I. Below you are given a scatterplot of twenty five 2004 model cars showing the weight of the car (in thousands of pounds) and the miles per gallon for the car (mpg). The average weight of the 25 cars is 4,037.8 pounds and the average mpg for the cars is 24.6. The correlation coefficient for the two variables weight and mpg is 0.8666. Please answer the following questions: (55 points total)

(a) Describe the relationship between the two variables weight and mpg (form, direction, strength). (9 points)

This is a roughly linear relationship with negative association that is relatively strong.

(b) The equation of the regression line is given by

$$\hat{y} = 45.645 - 5.222x \text{ where } y \text{ is}$$

mpg and x is weight (in thousands of pounds). Accurately graph the regression line on the graph above. Note that the vertical axis is located at $x = 2$. (10 points)

$$\text{at } x=2 \quad \hat{y} = 35.201$$

(c) For each increase in weight of cars by 1000 pounds, what does the regression model given in part (b) predict? (10 points)

It predicts a decrease in miles per gallon of about 5.2 mpg.

(d) What percent of the variation in mpg is explained by the linear regression model given in part (b)? (6 points)

$$r^2 = (.8666)^2 = .75099$$

About 75.1%

(e) The Mercedes Benz SLR was one of the twenty five models in the data set. It weighs 3,220 pounds and gets 22 mpg. Clearly indicate on scatterplot above which point corresponds to the Mercedes Benz SLR. (7 points)

(f) What mpg does the regression model given in part (b) predict for the Mercedes Benz SLR described in part (e)? (7 points)

$$\hat{y} = 45.645 - 5.222(3.220) = \boxed{28.830 \text{ mpg}}$$

Note: This makes sense given the above graph.

(g) Find the residual for the data point associated with the Mercedes Benz SLR. (6 points)

$$\text{Residual} = y - \hat{y} = 22 - 28.830 = \boxed{-6.83}$$

