STATISTICS
SECTION II
Part A
Questions 1-5
Spend about 65 minutes on this part of the exam.
Percent of Section II score—75

Directions: Show all your work. Indicate clearly the methods you use, because you will be scored on the correctness of your methods as well as on the accuracy and completeness of your results and explanations.

1. Researchers studying a pack of gray wolves in North America collected data on the length x, in meters, from nose to tip of tail, and the weight y, in kilograms, of the wolves. A scatterplot of weight versus length revealed a relationship between the two variables described as positive, linear, and strong.

   (a) For the situation described above, explain what is meant by each of the following words.

   (i) Positive:

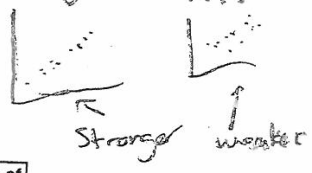
   In general, as the length of the gray wolves increases the general trend of the data suggests that weight will increase as well. A positive association means that the data is in general going upwards from left to right when graphing length, x, vs weight, y.

   (ii) Linear:

   Linear means that the data appears to be clustered around a line, and the data is not better followed by another curve. the graph between length and weight is best described by a line.

   (iii) Strong:

   This means that the data is well modelled by a line The residuals are generally fairly small, and the line is a good fit.



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The data collected from the wolves were used to create the least-squares equation $\hat{y} = -16.46 + 35.02x$.

(b) Interpret the meaning of the slope of the least-squares regression line in context.

As the length of a gray wolf increases by one meter, the least squares regression line predicts that the weight in kilograms of a wolf would increase by approximately 35.02.

(c) One wolf in the pack with a length of 1.4 meters had a residual of −9.67 kilograms. What was the weight of the wolf?

$y - \hat{y} = -9.67$ from the residual

$x = 1.4$m, the actual length of the wolf

$\hat{y} = -16.46 + 35.02 \cdot 1.4 = 32.57$ kg

$y = \hat{y} - 9.67 = 32.57 - 9.67 = \boxed{22.90 \text{ kg}}$