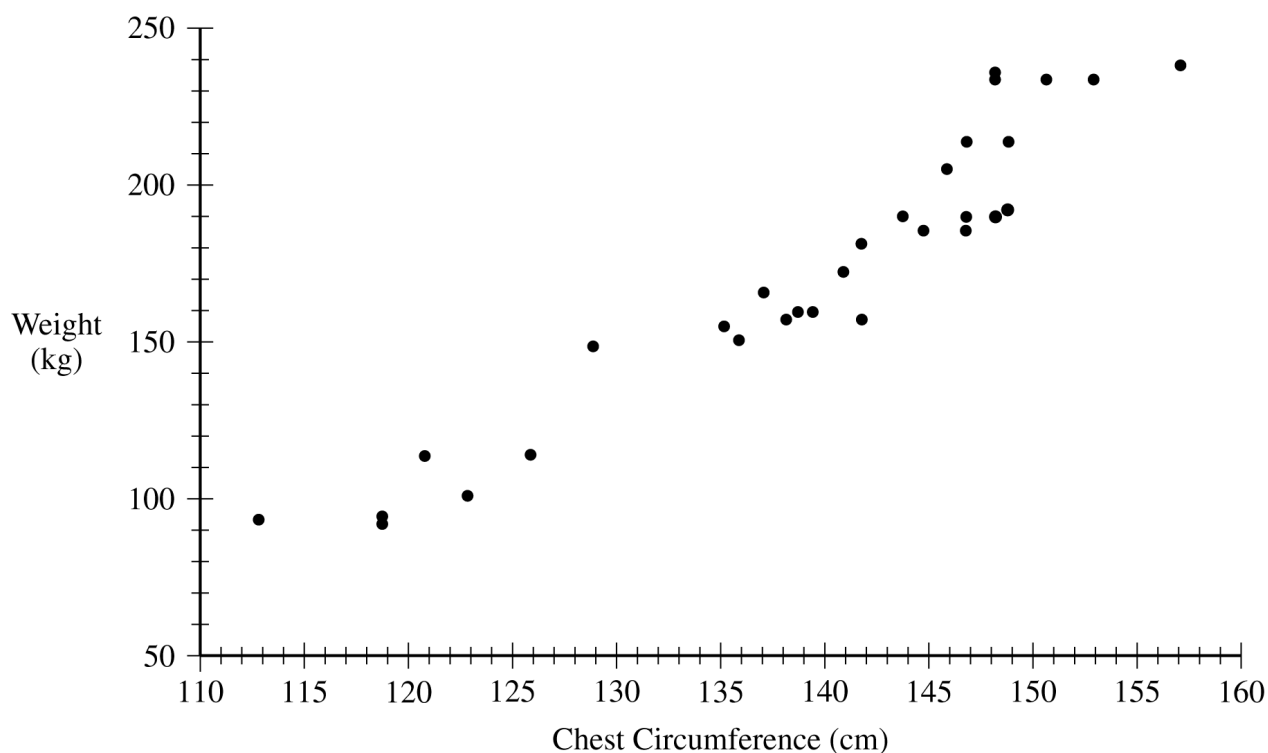


Wildlife biologists are interested in the health of tule elk, a species of deer found in California. An important measurement of tule elk health is their weight. The weight of a tule elk is difficult to measure in the wild. However, chest circumference, which is believed to be related to the weight of a tule elk, can easily be measured from a safe distance using a harmless laser. A study was done to investigate whether chest circumference, in centimeters (cm), could be used to accurately estimate the weight, in kilograms (kg), of male tule elk. For the study, wildlife biologists captured 30 male tule elk, measured their chest circumference and weight, and then released the elk. The data for the 30 male tule elk are shown in the scatterplot.



(a) Describe the relationship between chest circumference and weight of male tule elk in context.

GO ON TO THE NEXT PAGE.

Continue your response to **QUESTION 5** on this page.

Following is the equation of the least-squares regression line relating chest circumference and weight for male tule elk.

$$\text{predicted weight} = -350.3 + 3.7455(\text{chest circumference})$$

- (b) The weight of one male tule elk with a chest circumference of 145.9 cm is 204.3 kg.
- (i) Using the equation of the least-squares regression line, calculate the predicted weight for this male tule elk. Show your work.

- (ii) Calculate the residual for this male tule elk. Show your work.

GO ON TO THE NEXT PAGE.

The equation of the least-squares regression line relating chest circumference and weight for male tule elk is repeated here.

$$\text{predicted weight} = -350.3 + 3.7455(\text{chest circumference})$$

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

(d) The sambar, another species of deer, is similar in size to the tule elk. The slope of the population regression line relating chest circumference and weight for all male sambars is 4.5 kilograms per centimeter. A wildlife biologist wants to determine whether the slope of the population regression line for male tule elk is different than that for male sambars. Let β represent the slope of the population regression line for male tule elk. The wildlife biologist conducted a test of the following hypotheses using the sample of 30 tule elk.

$$H_0: \beta = 4.5$$

$$H_a: \beta \neq 4.5$$

The test statistic was calculated to be 3.408. Assume all conditions for inference were met.

(i) Determine the p -value of the test.

GO ON TO THE NEXT PAGE.

Name:

AP Statistics: 2023

Continue your response to **QUESTION 5** on this page.

- (ii) At a significance level of $\alpha = 0.05$, what conclusion should the wildlife biologist make regarding the slope of the population regression line for male tule elk? Justify your response.

GO ON TO THE NEXT PAGE.