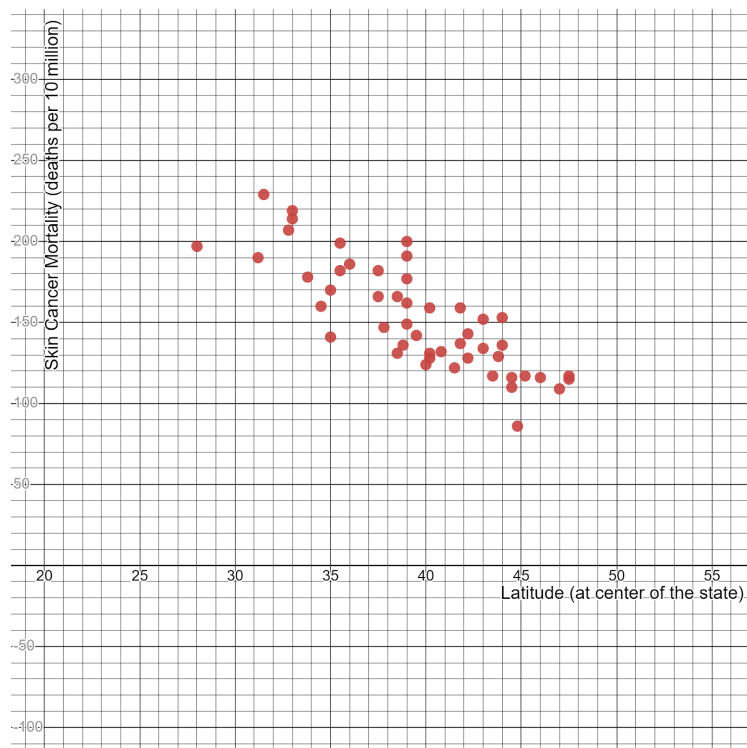


9.3.1: Exercises

- Below is a scatterplot of latitudes (at the center of the state) (degrees north) and skin cancer mortality (deaths per 10 million) for 49 US states from the 1950s. Click on the image below or scan the QR code and follow the link to see the set of data in desmos.



Images are created with the graphing calculator, used with permission from Desmos Studio PBC.

- Compute the linear correlation coefficient, sample mean and sample standard deviation for the explanatory variable, and sample mean and sample standard deviation for the response variable. Round all values to three decimal places.

$$r = \text{corr}(x1, y1) =$$

$$\bar{x} = \text{mean}(x1) =$$

$$s_x = \text{stdev}(x1) =$$

$$\bar{y} = \text{mean}(y1) =$$

$$s_y = \text{stdev}(y1) =$$

b. Compute the slope of the line of best fit, $m = r \cdot \frac{s_y}{s_x}$.

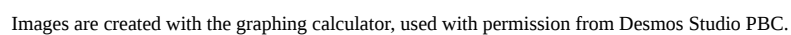
c. Compute the y-intercept of the line of best fit, $(0, b = \bar{y} - m \cdot \bar{x})$.

d. Write the equation of the line of best fit, $\hat{y} = mx + b$.

e. Interpret the slope of the line of best fit in context.

f. Interpret the y-intercept of the line of best fit in context.

g. Use the line of best fit to predict the skin cancer mortality rate for a state that has a central latitude of 25 degrees north.



- <https://stats.libretexts.org/@go/page/49070>

c. Biologists expect the average rainfall to be cut in half in the next year. By how much should they expect the number of plant species to change?

d. Use the line of best fit to predict the number of plant species in a region that gets 60 inches of rainfall on average.

e. In the region that gets 14 inches of rainfall on average, 450 different plant species were observed by biologists. Compute the residual for this region.

f. Based on the residual you found in e, where is the point relative to the line of best fit? Explain.

3. Mathematically, what is the process for creating the line of best fit for bivariate data?

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