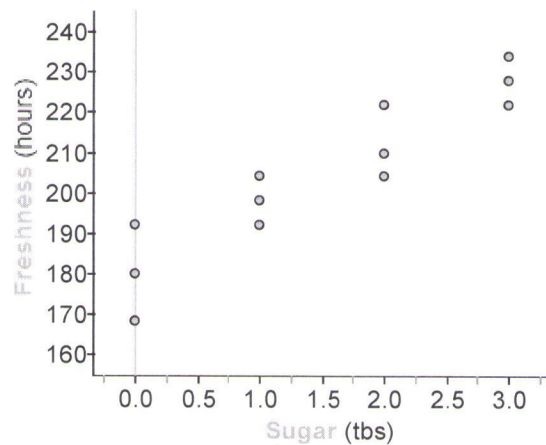


### Chapter 3 FRAPPY!

Sample 1

*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.*

Two statistics students went to a flower shop and randomly selected 12 carnations. When they got home, the students prepared 12 identical vases with the same amount of water in each vase. They put one tablespoon of sugar in 3 vases, two tablespoons of sugar in 3 vases, and three tablespoons of sugar in 3 vases. In the remaining 3 vases, they put no sugar. After the vases were prepared, the students randomly assigned one carnation to each vase and observed how many hours each flower continued to look fresh. A scatterplot of the data is shown below.



(a) Briefly describe the association shown in the scatterplot.

There is a positive association b/n sugar and freshness. The association is linear and pretty strong.

(b) The equation of the least-squares regression line for these data is  $\hat{y} = 180.8 + 15.8x$ . Interpret the slope of the line in the context of the study.

The predicted amount of ~~the~~ hours of freshness goes up by 15.8 for each tablespoon of sugar that's added.

(c) Calculate and interpret the residual for the flower that had 2 tablespoons of sugar and looked fresh for 204 hours.

$$\hat{y} = \overset{180.8}{\cancel{180.8}} + 15.8(2) = 212.4$$

$$y - \hat{y} = 204 - 212.4 = -8.4$$

This point was 8.4 from the regression line.

(d) Suppose that another group of students conducted a similar experiment using 12 flowers, but included different varieties in addition to carnations. Would you expect the value of  $r^2$  for the second group's data to be greater than, less than, or about the same as the value of  $r^2$  for the first group's data? Explain.

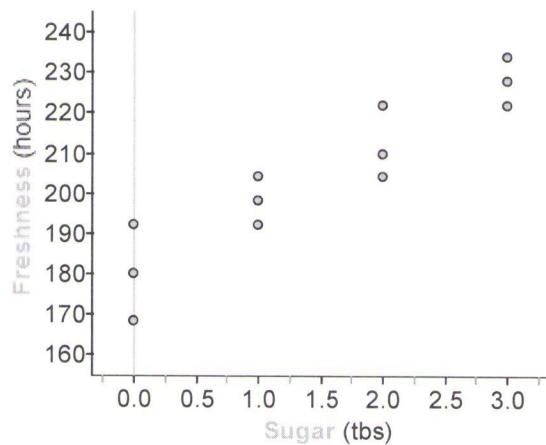
If the second group uses different types of flowers, there will be more variability in the experiment. Therefore, the value of  $r^2$  will be lower for the second group.

### Chapter 3 FRAPPY!

Sample 2

*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.*

Two statistics students went to a flower shop and randomly selected 12 carnations. When they got home, the students prepared 12 identical vases with the same amount of water in each vase. They put one tablespoon of sugar in 3 vases, two tablespoons of sugar in 3 vases, and three tablespoons of sugar in 3 vases. In the remaining 3 vases, they put no sugar. After the vases were prepared, the students randomly assigned one carnation to each vase and observed how many hours each flower continued to look fresh. A scatterplot of the data is shown below.



(a) Briefly describe the association shown in the scatterplot.

As you add more sugar, the flowers stay fresher longer.

(b) The equation of the least-squares regression line for these data is  $\hat{y} = 180.8 + 15.8x$ . Interpret the slope of the line in the context of the study.

For each increase of 1 unit of  $x$ , the value of  $y$  goes up by 15.8.

(c) Calculate and interpret the residual for the flower that had 2 tablespoons of sugar and looked fresh for 204 hours.

$$\text{actual} = 204$$

$$\text{predicted} = 212.4$$

$$\text{residual} = 212.4 - 204 = 8.4$$

The flower stayed fresh for 8.4 hours less than expected.

(d) Suppose that another group of students conducted a similar experiment using 12 flowers, but included different varieties in addition to carnations. Would you expect the value of  $r^2$  for the second group's data to be greater than, less than, or about the same as the value of  $r^2$  for the first group's data? Explain.

Because the second group is using the same number of flowers, I expect  $r^2$  to stay about the same.