In Class Activity

Regression on the Rebound

Activity used and modified with permission of Buskirk & Young (2001).

Group Member Names: _____

In this version of the "Keep your eyes on the ball" activity by Bereska, et al. (1999), each group is to explore the relationship between the ball's rebound height and the height from which it is initially dropped. Here, rebound height is defined to be the highest level of ascent that the ball makes after impact with the floor or table.

1. If we wish to take repeated measurements to collect data to investigate this, what issues must we attend to while collecting the data?

2. For this study, identify the following:
   a. Population:

   b. Sample:

   c. Variable(s):

3. If we wish to analyze this data (by making a scatterplot for example), which of our variables is the explanatory (independent) variable and which is the response (dependent) variable?

   • Explanatory (independent) variable is:

      _____

   • Response (dependent) variable is: _____

Now collect 3 rebound heights for 10 drop heights. For example, you will drop the ball 3 times from 36 inches and record the 3 associated rebound heights. Repeat this process 9 more times for different drop heights of your choosing.   **(Round your heights to the nearest half-inch or whole inch.)**

- Why do you think we collect *three* measurements from the *same* drop heights?

Drop Height (inches)	Rebound Height (inches)	Drop Height (inches)	Rebound Height (inches)
36			
36			
36			

4. Notice that all rebound heights are not the same for a given drop height. Why?

5. After completing data collection, use your calculator to create a scatter plot of the data. Put a sketch of your scatterplot here:

6. Do you see a pattern in your scatter plot? If so, describe it.

7. a. What is the equation of the least squares regression line, using your calculator? (Round each value to 2 decimal places)

   b. Rewrite this equation, using **words** for the variables:

8. a. What is the slope? _____ (Round to 2 decimal places)
   b. What is the interpretation of the slope in the context of this experiment? That is, what does this imply about the behavior of the ball after it is dropped?

9. a. What is the *y*-intercept? _____ (Round to 2 decimal places)
   b. What is the interpretation of the *y*-intercept in the context of this experiment?

   c. Based on the physical actions of a bouncing ball, what would you expect the *y*-intercept to be?

   d. Is your observed *y*-intercept "close enough" to what is expected?

10. a. Find the correlation coefficient, r: _____ (round to 2 decimal places)

b. Interpret the correlation coefficient in the context of this experiment:

11. a. Find the coefficient of determination, r^2: _____ (round to 3 decimal places)

b. Interpret the coefficient of determination in the context of this experiment:

12. a. Use your model to **predict** the rebound height for a ball dropped from a height for which you did not collect data.

- Dropping the ball from a height of _____ inches **should** have a rebound height of _____ inches.

b. Now, drop the ball 3 times from that height for which the prediction was made. How close was the rebound height to your prediction?

MAIN IDEAS: List the Main Ideas for Today's Lesson