Extra (Chapter 12)

1. (20 points) Consider packet 4, number 1:

   A group of fourth–grade students measured their height and wingspan and found

   average height = 49.5 inches with an SD of 1.8 inches average wingspan = 48.9 inches with an SD of 2.1 inches

   The scatter diagram was football-shaped and the correlation coefficient was 0.8.

   (a) Find the equation of the regression line for predicting wingspan from height.

   $ave_x = 49.5$
   $SD_x = 1.8$
   $ave_y = 48.9$
   $SD_y = 2.1$

   $$slope = r \frac{SD_y}{SD_x} = .8\left(\frac{2.1}{1.8}\right) = .933$$

   could be a bit different due to roundoff

   $$intercept = ave_y - slope(ave_x) = 48.9 - .933(49.5) = 2.72$$

   wingspan = 2.72 + .933 height ⎫ one of these must be given.
   $y = 2.72 + .933x$ ⎭

   (b) Use your equation to predict the wingspan of a child who is 52 inches tall.

   $$wingspan = 2.72 + .933(52) = 51.24''$$

   (c) What is the rms error for your answer in part b)?

   $$\sqrt{1-r^2}\,(SD_y) = .6(2.1) = 1.26''$$

   (d) Would you be surprised to find out that the child had a wingspan of 54 inches? Explain.

   $$51.24 - 2(1.26) = 48.72$$
   $$51.24 + 2(1.26) = 53.76$$

   54 is a bit outside, so I would be a little surprised.

   (e) Find the equation of the regression line for predicting height from wingspan.

   $ave_x = 48.9$
   $SD_x = 2.1$
   $ave_y = 49.5$
   $SD_y = 1.8$

   $$slope = .8\left(\frac{1.8}{2.1}\right) = .686$$
   $$intercept = 49.5 - .686(48.9) = 15.95$$

   height = 15.95 + .686 (wingspan)

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