Regression Methods

A survey of heights and weights of a group of men led to the following results:

$$\begin{array}{rll} \text{average weight} \approx 164 \text{ pounds}, & \text{SD} \approx 30 \text{ pounds} & \\ \text{average height} \approx 67 \text{ inches}, & \text{SD} \approx 2.5 \text{ inches}, & r \approx 0.60 \end{array}$$

1. (a) Estimate the average height of all men who weigh 204 pounds.
   (b) Estimate the average weight of all men are 72 inches tall.
   (c) Is there a contradiction? 72 inches is more than the average height of the men who weigh 204 pounds, but the average weight of the 72-inch-tall men is less than 204 pounds. Explain.

2. Predict the percentile rank of the height of a man whose weight is at the 21st percentile.
   (A) 21% (B) 29% (C) 31% (D) 38% (E) 50%

3. (a) Find the r.m.s. error for the regression prediction of height from weight.
   (b) Find the r.m.s. error for the regression prediction of weight from height.

4. When predicting weight from height:
   (a) how often (what % of the time) will the prediction be right to within 12 pounds?
   (b) how often (what % of the time) will the prediction be off by 48 pounds or more?

5. A man in the group who weighed 150 pounds overate and gained 30 pounds. What happened to his height. Did it increase 1.5 inches with the use of the regression method?

6. (a) Find the regression equation for predicting height from weight.
   Use that equation to predict the height of a man who weighs: (a) 164 pounds; (b) 204 pounds.
   (b) Find the regression equation for predicting weight from height.
   Use that equation to predict the weight of a man whose height is: (a) 67 inches; (b) 72 inches.

7. Hal is $7\frac{1}{2}$ inches taller than Joe. How many pounds heavier would he be predicted to be?