

Math 110

Quiz 2 Sample Solutions

September 21, 2007

Be sure to provide explanations for your answers as indicated.

1. (a) Briefly, explain the term “ecological correlation.”

An ecological correlation is between averages or percentages.

- (b) What is the problem inherent in ecological correlations?

Ecological correlations tend to overstate the strength of an association between variables.

2. The SAT math scores for a city are normally distributed with an average of 550 and standard deviation equal to 80. What is the percentile for a score of 600? (*Hint:* It may help to sketch a smooth histogram for the scores.)

To answer the question, it's necessary to find the area under a normal curve approximating the data lying to left of a score of 600. First, convert 600 to z -value:

$$z = \frac{600 - 550}{80} = .625$$

The corresponding area is approximately 47%. This is a symmetric centered at the mean. To complete the question, add the area of the left-hand tail, $\frac{1}{2}(100 - 47)\% = 26.5\%$, to 47% to get a percentile of $26.5 + 47 = 73.5$.

3. The attached diagram is a scatter plot for the test scores on the first and second hour exams of a class of 23 students. The mean on the first test was 83 and the SD was 9.5. The mean on the second test was 84.7 and the SD was 10.6.

- (a) Plot the SD line for the data on the scatter plot. Be sure to label the point of averages.

To plot the SD line, plot the point of averages, (83,84.7), plot the point of averages plus one standard deviation in each coordinate $(83, 84.7) + (9.5, 10.6) = (83 + 9.5, 84.7 + 10.6) = (92.5, 95.3)$, and then sketch the line connecting the two points.

- (b) Would you say the r -value for the data was closer to .25, .5, or .9? Why?

The r value appears to be closer to .5 than .25 or .9, because the data has a clear direction—so it isn't .25—but is not tightly aligned in this direction—so it isn't .9.