

STOR 155 Summer Session II, Exam 2 (6/8/2010)

Name: _____ PID: _____

Instructions: Both the exam and the bubble sheet will be collected. On the bubble sheet, print your name and ID number, sign the honor pledge, also bubble in your name and ID number. Each question has only one correct choice (decimals may need rounding). Use #2 pencil only (do not use ink) to fill bubble completely. No notes or remarks are accepted. Do not tear or fold the bubble sheet.

A grade zero will be assigned for the entire exam if the bubble sheet is not filled out according to the above instructions.

Use the following to answer questions 1 -- 2:

Many high school students take either the SAT or the ACT. However, some students take both. Data was collected from 60 students who took both college entrance exams. The average SAT score was 912 with a standard deviation of 180. The average ACT score was 21 with a standard deviation of 5. The correlation between the two variables equals 0.817.

1. To predict the SAT score from a student's ACT score, what is the equation of the least-squares regression line?
 - (1) $\hat{y} = 0.3027 + 0.0227 x$
 - (2) $\hat{y} = 294.348 + 29.412 x$
 - (3) $\hat{y} = 156 + 36 x$
 - (4) Cannot be determined from the information given.
2. What fraction of the variation in the values of the SAT scores is accounted for by the linear relationship between SAT and ACT scores?
 - (1) 66.7%
 - (2) 81.7%
 - (3) 90.4%
 - (4) Cannot be determined from the information given.

3. Recall that when we standardize the values of a variable, the standardized value has mean 0 and standard deviation 1. Suppose we measure two variables X and Y on each of several subjects. We standardize both variables and compute the least-squares regression line of Y on X for these standardized values. Suppose the slope of this least-squares regression line is -0.44 . What conclusion can we draw?
- (1) The intercept will be 1.0.
 - (2) The intercept will also be -0.44 .
 - (3) The correlation will be 1.0.
 - (4) The correlation will be -0.44 .
4. Using least-squares regression, it is determined that the logarithm (base 10) of the population of a country is related to the year by the following equation:
- $$\log(\text{population}) = -13.5 + 0.01 \times (\text{year})$$
- Based on this equation, what will the (approximate) population of the country in the year 2006 be?
- (1) 6.56
 - (2) 706
 - (3) 2,006,000
 - (4) 3,630,780

Use the following to answer questions 5 -- 6:

A researcher wishes to determine whether the rate of water flow (in liters per second) over an experimental soil bed can be used to predict the amount of soil washed away (in kilograms). The researcher measures the amount of soil washed away for various flow rates, and from these data calculates the least-squares regression line to be amount of eroded soil = $0.4 + 1.3 \times (\text{flow rate})$

5. What do we know about the correlation between amount of eroded soil and flow rate?
- (1) $r = 1/1.3$
 - (2) $r = 0.4$
 - (3) It would be positive, but we cannot determine the exact value.
 - (4) It would either be positive or negative. It is impossible to say anything about the correlation from the information given.
6. One of the flow rates used by the researcher was 0.3 liters per second and for this flow rate the amount of eroded soil was 0.8 kilograms. These values were used in the calculation of the least-squares regression line. What is the residual corresponding to these values?
- (1) 0.01
 - (2) -0.01
 - (3) 0.5
 - (4) -0.5

7. An electronics store is handing out a survey to their clients who buy a DVD player. Some of the questions on the survey ask the clients to rate the DVD player on ease of use, appearance, price, etc. Another question asks for the client's age. From all the different ratings on the survey, a total assessment score is calculated. The correlation between this total assessment score and age of the client is -0.165 . The store owner can legitimately conclude which of the following?
- (1) Older clients seem not to like DVD players.
 - (2) There is a negative linear relationship between age and assessment score.
 - (3) Age does not help much in predicting assessment score.
 - (4) None of the above. We really need to look at a scatterplot of the data first.
8. Event A occurs with probability 0.2 . Event B occurs with probability 0.8 . If A and B are independent, then
- (1) $P(A \text{ and } B) = 0.016$
 - (2) $P(A \text{ or } B) = 1.0$
 - (3) $P(A \text{ and } B) = 1.0$
 - (4) $P(A \text{ or } B) = 0.84$
9. Belgium has two official languages — French and Dutch. Assume that about 60% of the people speak Dutch and 40% of the people speak French. Define the event A as the event that two randomly selected Belgians speak the same language. What is the complement of event A ?
- (1) 0.48
 - (2) 0.52
 - (3) {Dutch, French}
 - (4) {(Dutch, French), (French, Dutch)}
10. Ignoring twins and other multiple births, assume babies born at a hospital are independent events with the probability that a baby is a boy and the probability that a baby is a girl both equal to 0.5 .
What is the probability that at least one of the next three babies is a boy?
- (1) 0.125
 - (2) 0.333
 - (3) 0.750
 - (4) 0.875