AMERICAN UNIVERSITY OF BEIRUT

Statistics 201, Final Examination

Time = 1 hour and 30 minutes

June 9, 2004

Aids allowed: One standard formula sheet, a calculator, the standard normal table, and the student-t table.

Instructions: Please, use the question sheet to mark your answers. One and only one answer is permissible for the multiple choice questions; otherwise you may lose credits for multiple answers.

Please, use the booklet to explain your answers and hence you might earn partial credits if answer were incorrect.

Finally, PRINT your name and ID number on both question sheet and booklet! Good Luck!

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(1) The scores of 7 randomly selected students for a calculus test were:

71, 63, 80, 27, 69, 50, 60

An additional 10 points were given to each score to adjust for the average. What is the new mean of the scores?

(a) 60 (b) 65 (c) 70 (d) 75 (e) none of the above [7 pts]

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(2) Refer to previous data of question (1). Which one of the following statement about s, the sample standard deviation, is correct:

(a) The sample standard deviation remains unaffected after adding the 10 points to each score.

(b) The sample standard deviation increases by 10 after adding the 10 points to each score.

(c) The sample standard deviation decreases by 10 after adding the 10 points to each score.

(d) The sample standard deviation decreases by a multiple $1/\sqrt{10}$ after adding the 10 points to each score.

(e) none of the above [7 pts]

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(3) Consider the following bivariate set of data points:

X	0.3	0.5	0.6	0.7	0.8
Y	55	65	75	70	85

What is the intercept b_0 of the least squares regression line for the above data? (Summary calculations gave $\sum X = 2.9$, $\sum Y = 350$, $\sum X^2 = 1.83$, $\sum Y^2 = 25000$, and $\sum XY = 211$)

(a) 2.90 (b) 38.65 (c) 54.05 (d) 70.00 (e) none of the above [7 pts]

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(4) Refer to previous question (3). What percentage of variation in the Y variable has been explained by the linear regression fit?

(a) 86% (b) 74 % (c) 68% (d) 96% (e) none of the above [7pts]

(5) A fair coin is tossed 4 times. Let A be the event of getting exactly 2 heads. What is P(A) ?

(a) 2/16 (b) 4/16 (c) 6/16 (d) 8/16 (e) none of the above [7pts]

(6) Refer to previous question (5). What is the probability of the event B ={ at least one tail}?

(a) 15/16 (b) 7/16 (c) 3/16 (d) 1/16 (e) none of the above [7pts]

(7) You are given two events A and B such that P(A)=1/4, P(B)=1/3, and P(A or B)=1/2. Which one of the following statements is correct:

(a) P(A &B) = 0 (b) P(A&not(B)) = 1/12 (c) P(not(A)& B) = 1/4
(d) P(not(A) &not(B)) = 1/4 (e) none of the above [8 pts]

(8) The scores of the GRE exam are normally distributed with mean $\mu = 500$ and a standard deviation $\sigma = 100$. Approximately, what is the interquartile range, $IQR=Q_3 - Q_1$?

(a) 100 (b) 135 (c) 200 (d) 567 (e) none of the above [8 pts]

(9) Refer to previous question (8). Approximately, what percentage of students had a score above 800?

(a) 99% (b) 50% (c) 2% (d) 0.13% (e) none of the above [7pts]

(10) Refer to previous question (8). 16 scores were randomly selected and their average, $\bar{x}$, was calculated. Find the probability that their average, $\bar{x}$, exceeds 575.

(a) 0.0013 (b) 0.0150 (c) 0.7145 (d) 0.9987 (e) none of the above [7pts]

(11) A random sample for the systolic blood pressure of 25 diabetic children gave a mean $\bar{x} = 92.6$ mm and a sample standard deviation $s = 8.5$. Assume that the systolic blood pressure follows a normal distribution with

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unknown mean μ and unknown standard deviation. What is the margin of error for a 99% confidence interval for μ.

(a) 4.755 (b) 2.797 (c) 6.331(d) 8.500 (e) none of the above [7pts]

(12) It is known from past experience that a sea shell has an unknown mean μ and a known standard deviation $\sigma = 2.5$ mm. What sample size is required in order to have a margin of error of 0.1 and a confidence of 95%

(a) 1001 (b) 1500 (c) 2001 (d) 3350 (e) none of the above [7pts]

$= \left(\frac{2.5 \times 1.96}{0.1}\right)$

(13) Central limit theorem states:

(a) The sample mean is zero
(b) The sample mean has approximately a normal distribution
(c) The binomial distribution is left skewed
(d) The sample standard deviation is approximately normal
(e) none of the above [7pts]

(14) The mean monthly bill, μ, for a cell phone in 1996 was \$75.70. A consumer protection organization collects data on cell phone bills and suspects that it has increased on the average since 1996. They formulate a null hypothesis and an alternative hypothesis to test their claim. Then the hypothesis that asserts their claim is:

(a) H_0: $\mu = 75.70$ versus H_a: $\mu < 75.70$
(b) H_0: $\mu = 75.70$ versus H_a: $\mu > 75.70$
(c) H_0: $\mu = 75.70$ versus H_a: $\mu \neq 75.70$
(d) H_0: $\mu \geq 75.70$ versus H_a: $\mu < 75.70$
(e) none of the above [7pts]