Sample Examination Two

Section I

Time–1 hour and 30 minutes
Questions 1–40
Percent of total grade–50

Directions: The questions or incomplete statements that follow are each followed by five suggested answers or completions. Choose the response that best answers the question or completes the statement.

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1. Creating a sample of students by starting with the second name in the student directory and selecting every 15th name best describes

   (A) random sampling
   (B) cluster sampling
   (C) stratified sampling
   (D) systematic sampling
   (E) convenience sampling

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2. A random sample of size 16 is to be taken from a normal population having mean 100 and variance 4. What is the 90th percentile of the distribution of $\bar{x}$?

   (A) 97.44
   (B) 100.08
   (C) 100.32
   (D) 100.64
   (E) 102.56

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3. In each of the following, the p-value and significance level α are given for a test of hypothesis. Which pair of values warrants a rejection of the null hypothesis?

   (A) p-value = 0.0312, $\alpha = 0.01$
   (B) p-value = 0.0411, $\alpha = 0.05$
   (C) p-value = 0.0529, $\alpha = 0.05$
   (D) p-value = 0.0674, $\alpha = 0.05$
   (E) p-value = 0.1328, $\alpha = 0.10$

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4. Suppose A and B are events with the given probabilities: $P(\text{A}) = 0.62$, $P(\text{B}) = 0.44$ and $P(\text{A and B}) = 0.31$. Which of the following conclusions can be drawn from the data?

   (A) $P(\text{A or B}) = 0.75$
   (B) A and B are mutually exclusive events.
   (C) A and B are independent events.
   (D) $P(\text{A}|\text{B})$ cannot be determined from the given information.
   (E) $P(\text{B}|\text{A})$ cannot be determined from the given information.

5. Failing to reject a null hypothesis that is false can be characterized as

(A) a Type I error
(B) a Type II error
(C) both a Type I and Type II error
(D) a standard error of the mean
(E) no error

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6. If a 95% confidence interval is given by (86.52, 89.48), which of the following could be a 99% confidence interval for the same data?

I. (86.98, 89.02)
II. (86.37, 89.63)
III. (87, 89)

(A) I only
(B) II only
(C) III only
(D) I and III
(E) II and III

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7. Which of the following represents a probability density function?

(A) $f(x)=\begin{cases}0.6 & \text{for } 2<x<4\\ 0 & \text{elsewhere}\end{cases}$

(B) $f(x)=\begin{cases}0.2 & \text{for } 0\le x\le 2\\ 0.3 & \text{for } 2<x\le 4\\ 0 & \text{elsewhere}\end{cases}$

(C) $f(x)=\begin{cases}0.1 & \text{for } 0\le x\le 5\\ 0.2 & \text{for } 5<x\le 10\\ 0 & \text{elsewhere}\end{cases}$

(D) $f(x)=\begin{cases}0.5 & \text{for } 0\le x\le 20\\ 0 & \text{elsewhere}\end{cases}$

(E) None of the above

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8. Maritsa scored 82 on a geometry exam for which the class mean was 74 and the standard deviation 3.2 and she scored 86 on a biology exam for which the class mean was 77 with a standard deviation of 2.9. In comparison to other members of each of these classes, which of the following conclusions can you draw?

(A) Her performance on the geometry exam was better than her performance on the biology exam.
(B) Her performance on the biology exam was better than her performance on the geometry exam.
(C) Her relative performance was the same for both exams.
(D) Her relative performance was graded unfairly.
(E) No conclusion can be drawn from this data.

9. Assuming that birthdays are uniformly distributed throughout the week, the probability that two strangers passing each other on the street were both born on Sunday is

(A) 1/7
(B) 2/7
(C) 1/49
(D) 2/49
(E) 4/49

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10. Which of the following are characteristics of a t-distribution curve?

I. The graph of a t-distribution extends infinitely to the left and to the right and approaches the x-axis asymptotically as x increases in absolute value.
II. There are an infinite number of different t-curves, each determined by a parameter called degrees of freedom.
III. The maximum point on the graph of a t-distribution occurs at its mean which is always 0.

(A) I only
(B) II only
(C) III only
(D) I and III only
(E) I, II, and III

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11. A teacher raised each student's grade by 10 points on an algebra exam. Which of the following describes the correlation between students' original grades and their adjusted grades?

(A) slightly negative
(B) slightly positive
(C) close to 0
(D) –1
(E) 1

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12. In conducting a hypothesis test, the p-value is the

(A) probability of obtaining a result as extreme or more extreme than the one obtained if the null hypothesis is true
(B) significance level of the test
(C) probability of making a Type I error
(D) probability of making a Type II error
(E) probability that the null hypothesis is true

13. In constructing a confidence interval based on a large sample to estimate the mean μ of a population with a known standard deviation σ, which of the following does NOT affect the width of the confidence interval?

(A) the sample mean
(B) the population standard deviation
(C) the confidence level
(D) the sample size
(E) the sample standard deviation

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14. Which of the following are conditions for a binomial experiment?

I. The number of trials n is a fixed number.
II. The n trials are independent.
III. The probability of success p is equal to the probability of failure q.

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I, II, and III

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15. Which of the following is NOT true concerning sampling distributions?

(A) If the sample size n is large, the sampling distribution of $\bar{x}$, drawn from a normal population, is approximately normal.
(B) The mean of the sampling distribution of $\hat{p}$ is equal to the population proportion p.
(C) The mean of the sampling distribution of the difference of two means $(\bar{x}_1 - \bar{x}_2)$ is equal to the difference of the population means $(\mu_1 - \mu_2)$.
(D) The standard deviation of the sampling distribution of $\bar{x}$ is $\sigma/\sqrt{n}$, where σ is the population standard deviation.
(E) The standard deviation of the sampling distribution of the differences of two means $\sigma_{\bar{x}_1 - \bar{x}_2}$ is equal to the sum of the respective population standard deviations.

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16. The all-time leader in career batting average among major league baseball players is Ty Cobb with a career average of 0.366. This means he got a hit in 36.6% of his official at-bats. What was Cobb's probability of getting at least one hit in four official at-bats?

(A) 0.092
(B) 0.134
(C) 0.162
(D) 0.366
(E) 0.838

17. Which of the following accurately describes the power of a statistical test of hypothesis?

(A) It is equal to the p-value.
(B) It is equal to 1- (p-value).
(C) It is equal to α, the significance level.
(D) It is the probability that a test using a fixed value of α will reject H_o when a particular alternative value of the parameter is true.
(E) It is equal to β.

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18. The equation of the least squares regression line for a set of points in a scatterplot is given by $\hat{y} = 2.2 + 0.81x$. The point (5, 7) is one point on this scatterplot. Which of the following is the residual for the point (5, 7)?

(A) 0.71
(B) 0.75
(C) 4.05
(D) 6.25
(E) 7.87

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19. The table below shows the probability distribution for the number of tails (X) in five tosses of a fair coin. What is E(X), the expected value of X?

X	0	1	2	3	4	5
P(X)	.03125	.15625	.3125	.3125	.15625	.03125

(A) 2.0
(B) 2.5
(C) 3.0
(D) 3.5
(E) 4.0

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20. Which of the following statements is a consequence of the Central Limit Theorem?

I. If the original population is uniformly disstributed, then the sampling distribution of $\bar{x}$ will be uniform for large samples.
II. The sampling distribution of $\bar{x}$ will be approximately normal for large samples.
III. The mean of the sampling distribution of $\bar{x}$ will be close to μ for large samples.

(A) I only
(B) II only
(C) III only
(D) II and III only
(E) I, II, and III