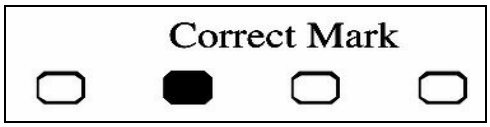
Instructor: Prof. Murdock
Duration: 50 minutes. You must stay in the test room the entire time.
Format: 18 multiple-choice questions with answers recorded on SCANTRON form. Total possible points are 90.
Allowed aids: A non-programmable calculator (and attached aid sheets, which you may detach)

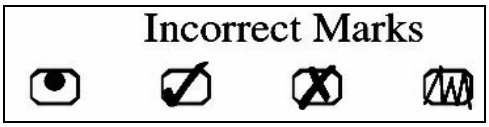
INSTRUCTIONS:
Do NOT write your answers on these test papers; You MAY do scratch work on these pages
ONLY those answers correctly marked on the SCANTRON form can earn positive marks

Correct answers are worth: **+ 5.00 points**
Incorrect answers are worth: **0 points**

- Use only a pencil or blue or black ball point pen

- **Pencil strongly recommended**, it can be erased if a mistake is made
- Make dark solid marks that fill the bubble completely





- Select the one best alternative
- Erase completely any marks you want to change
  - Crossing out a marked box is not acceptable and is incorrect

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1st : Print your **LAST NAME** and **INITIALS** in boxes provided
- Use exact name you are officially registered under
- Darken each letter in the corresponding bracket below each box

2nd : Print your 9 digit **STUDENT NUMBER** in the boxes provided
- Fill in zeros in front of the number if less than 9 digits
- Darken each number in the corresponding bracket below each box

3rd : Print 2 digit **FORM** number in the boxes provided
- Your FORM number is **02**
- Darken each number in the corresponding bracket below each box

4th : Sign your name in the **SIGNATURE** box

For the 18 questions mark your best answer on the SCANTRON form.

(1) Statistical inference helps us make inferences about _____.

(A) the Bell curve
(B) known sample statistics
(C) unknown sample statistics
(D) known population parameters
(E) unknown population parameters

(2) Mistakes are unavoidable in statistical inference. Which are taken into account by the formulas used for statistical inference?

(A) Sampling errors
(B) Non-sampling errors
(C) Errors in survey design
(D) Biases created by observational data
(E) Discrepancies between the target and sampled populations

(3) What does the Central Limit Theorem help us determine?

(A) The shape of the population
(B) The size of the population variance
(C) The mean of the distribution of our sample
(D) The shape of the sampling distribution of the sample mean
(E) How close the Bell curve approximates the shape of the population

(4) Why is the Student t distribution important for statistical inference?

(A) It helps correct non-sampling errors
(B) Most real-world data are Student t distributed
(C) It helps us make inferences about μ when σ^2 is unknown
(D) It is a good approximation for the Standard Normal distribution
(E) It can be used when the population is highly non-normal and n is small

(5) How do you choose the significance level for a specific problem?

(A) By using your judgment
(B) By consulting the Student t table
(C) There is no choice: you must use 0.05
(D) By consulting the Standard Normal table
(E) You calculate the correct one with a formula

(6) Suppose you draw a random sample of 100 observations from a population with mean = 20 and variance = 25. What is the probability that the sample mean is greater than 21?

(A) 0.0003
(B) 0.0228
(C) 0.1510
(D) 0.3166
(E) 0.4207

► For Questions **(7) – (9)**: Consider the number of mistakes made by a cashier in week. The following probability distribution describes this population.

Number of Mistakes	Probability
0	0.4
1	0.4
2	0.1
3	0.1

(7) Which statement about this probability distribution is true?

(A) It is Normal
(B) It is discrete
(C) It is Binomial
(D) It is negatively skewed
(E) It is a sampling distribution

(8) If one cashier is randomly selected, what is the chance that cashier made less than the average number of mistakes?

(A) 0.30
(B) 0.40
(C) 0.45
(D) 0.50
(E) 0.80

(9) If 100 cashiers are randomly selected, what is the chance that the sample on average made two or more mistakes?

(A) 0.00
(B) 0.05
(C) 0.09
(D) 0.17
(E) 0.20

(10) Suppose you used this formula $\overline{X} \pm z_{0.05} \frac{\sigma}{\sqrt{n}}$ and correctly computed a 90% confidence interval estimator of the population mean to be [10, 30]. Which of the following is FALSE?

(A) α is equal to 0.10
(B) The sample mean is equal to 20
(C) The point estimate of the population mean is 20
(D) About 90% of the population lies between 10 and 30
(E) You have a sufficiently large sample size or the population is Normal

(11) If Z is a Standard Normal random variable, what is P(Z > -1)?

(A) 0.1587
(B) 0.3413
(C) 0.6587
(D) 0.6826
(E) 0.8413

(12) To compute the 99% confidence interval estimator of the population mean with sample size 10, which is the correct tabular t value to use?

(A) 2.228
(B) 2.764
(C) 2.821
(D) 3.169
(E) 3.250

(13) When the Central Limit Theorem applies, what is the chance that the sample mean is smaller than the population mean?

(A) α
(B) 0.5
(C) $P(Z < \mu)$
(D) Exactly 0
(E) Approximately 0

(14) For a confidence interval estimator, the _____ determines the probability it includes μ.

(A) sample size
(B) tabular t value
(C) tabular z value
(D) significance level
(E) standard deviation of the population

(15) Which is a necessary condition for the sample proportion to be an unbiased estimator of the population proportion?

(A) No sampling error
(B) No simulation error
(C) No non-sampling errors
(D) A sufficiently large sample size
(E) A Bell-shaped (Normal) population

(16) For which can you use the Standard Normal table to compute the probability that the political candidate exceeds expectations?

Candidate	**Current Situation**
Bar	Front-runner, expected to get about 60% of votes
Huck	Last place, expected to get about 10% of votes

(A) Candidate Bar with n = 5
(B) Candidate Bar with n = 20
(C) Candidate Huck with n = 5
(D) Candidate Huck with n = 10
(E) Candidate Huck with n = 25

► For Questions **(17) – (18)**: A Monte Carlo simulation is used to find the sampling distribution of the sample mean. A random sample of size 80 is drawn from the population 100,000 times. For each draw the sample mean is calculated. Over the 100,000 draws, the average value of the sample mean is 9.999 and the standard deviation of the sample mean is 0.334.

(17) What would reduce the underlined number above (0.334)?

(A) Decrease the sample size to 40
(B) Increase the sample size to 160
(C) Draw from a Bell shaped population
(D) Increase the simulation draws 200,000
(E) Decrease the simulation draws to 50,000

(18) What is the total width of the 90% confidence interval estimator of the population mean?

(A) 0.08
(B) 0.12
(C) 0.24
(D) 0.67
(E) 1.11