Directions:
• Print your NAME on THIS EXAM.

• Print your NAME on your SCANTRON.

• Write FORM A on your SCANTRON.

• Put your Photo ID on your desk.

• Each question has exactly one BEST answer. There are 21 questions. Two questions are free response - be sure to write your answer on the exam.

• You may write on this exam. There is no scratch paper allowed.

• Each question is worth 5 points for a total of 105 points. This includes 5 bonus points!

• If you have no note page, you must write NO NOTES on your SCANTRON.

• When you are finished, put your SCANTRON and PAGE of NOTES inside this EXAM. Before you start packing up your things, turn in your EXAM, NOTES and SCANTRON. Then go back to your desk to pack up your materials. When your exam is returned, you will get back all materials you turned in.

• Turn your cell phone OFF. Any noise from a cell phone will signal that your exam is over.

• FAILURE TO FOLLOW ALL INSTRUCTIONS WILL COST YOU THE 5 BONUS POINTS!
1. How many of the following statements are true about continuous probability distributions?

- The total area under the curve of f(x) always equals 1.
- The probability that X takes on a specific value always equals 0.
- The standard deviation may be a negative value.
- The graph of the distribution may be skewed to the right.

A. 0  B. 1  C. 2  D. 3

Questions 2 – 3 refer to the following:
The heights of adult men in a certain county follow a normal distribution with a mean of 68 inches and a standard deviation of 3 inches.

2. Find the probability that a randomly selected adult man’s height in that county is within 1.5 standard deviations of the average height.

A. 0.4332  B. 0.8664  C. 0.1915  D. 0.3829

3. Find the third quartile of adult men’s heights in that county (rounded to the nearest inch).

A. 70 inches  B. 68 inches  C. 66 inches  D. 71 inches

Questions 4 – 5 refer to the following:
The graph below shows three normal probability distributions.

4. Which graph represents the Standard Normal Distribution?

A. none of them  B. I  C. II  D. III

5. Find the standard deviation of III.

A. 8  B. 6  C. 4  D. 2
Questions 6 – 8 refer to the following:
Let X follow an Exponential Distribution with a decay rate of 0.4.

6. Which of the following statements are true about the distribution of X?
   I. The graph of the distribution is skewed left.
   II. The graph of the distribution is skewed right.
   III. The mean is greater than the median.
   IV. X takes on the values \(-\infty\) to \(\infty\).

   A. I & III  
   B. II & III  
   C. II & IV  
   D. II only

7. Find \(P(X < 2)\).

   A. 0.4493  
   B. 0.9933  
   C. 0.5507  
   D. 0.2000

8. Suppose that random samples of size 36 were repeatedly drawn and the average of each sample was calculated. Which of the following statements is true about the random variable, \(\overline{X}\) ?

   I. The average for \(\overline{X}\) will be approximately 1.6.
   II. The average for \(\overline{X}\) will be approximately 2.5.
   III. The standard deviation for \(\overline{X}\) will be approximately 2.5.
   IV. The standard deviation for \(\overline{X}\) will be approximately 0.42.

   A. I & III  
   B. II & III  
   C. II & IV  
   D. II only

9. For continuous distributions that are skewed left with a mean = 12 and a standard deviation = 2, what will be the approximate distribution for \(\overline{X}\) when samples of size 225 are taken and averaged together?

   A. Mean = 12, Standard Deviation = 2/15, Distribution skewed left  
   B. Mean = 12, Standard Deviation = 2/225, Distribution skewed left  
   C. \(N(12, 2/15)\)  
   D. \(N(12, 2/225)\)
Questions 10 – 13 refer to the following:
A movie executive stated that CA teenagers pay to watch an average of at least 30 movies per year. You don't believe the statement and challenge the claim by conducting a simple random survey of 200 CA teenagers. You obtain a sample average of 28.5 movies with a standard deviation of 10 movies. Conduct a hypothesis test.

10. What are the appropriate hypotheses?
   A. $H_0: \mu < 30$, $H_a: \mu \geq 30$
   B. $H_0: \mu \geq 30$, $H_a: \mu < 30$
   C. $H_0: \mu = 30$, $H_a: \mu \neq 30$
   D. $H_0: \mu \leq 30$, $H_a: \mu > 30$

11. The Type I error for this test would be to conclude that
   A. the true average is at least 30 movies, when in reality it is less than 30 movies.
   B. the true average is less than 30 movies, when in reality it is at least 30 movies.
   C. the true average is at most 28.5 movies, when in reality it is more than 28.5 movies.
   D. the true average is more than 28.5 movies, when in reality it is at most 28.5 movies.

12. The p-value for this hypothesis test is:
   A. -2.1213
   B. 28.5
   C. 0.0176
   D. 0.0351

13. Construct a 90% Confidence Interval for the true average number of movies CA teens pay to watch each year.
   A. (27.33, 29.67)
   B. (27.26,29.74)
   C. (27.11, 29.89)
   D. (28.83,31.17)

Questions 14 – 15 refer to the following:
A survey of 125 drivers in Santa Clara County showed 105 used seat belts on a regular basis.

14. Find the error bound on a 92% confidence interval for the true proportion of drivers in Santa Clara County who wear a seatbelt on a regular basis.
   A. 0.1148
   B. 0.0574
   C. 0.0643
   D. 0.1286

15. To decrease the error bound at the same level of confidence what change should we make?
   A. Increase the sample size
   B. Use the Normal distribution
   C. Decrease the sample size
   D. Use the Student-t distribution

16. ON THE BACK OF YOUR SCANTRON, write an interpretation of the 92% confidence interval as a complete sentence. Your answer must include the confidence level and the actual bounds of the confidence interval. [Leave the front of your scantron blank for this answer]
Questions 17 – 19 refer to the following:
A trucking company applies "No-Rust" anti-rust protective coating to the bottom of its trucks. The thickness of the coating is between 2 and 5 mm thick and follows a uniform distribution.

17. Suppose that one truck with "No-Rust" coating is randomly selected. Find the probability that the thickness of the anti-rust coating on this truck is more than 3.2 mm.
   A. 0.6000      B. 0.4000      C. 0.6400      D. 0.3600

18. Find the value to complete the sentence:
The 30% of trucks with the thickest anti-rust coatings have coatings that are at least _____ mm thick.
   A. 3.95 mm      B. 2.9 mm      C. 3.5 mm      D. 4.1 mm

19. For a random sample of 50 trucks having this anti-rust coating, the probability distribution for the sample average thickness is
   A. N(3.5, 0.1225)   B. N(3.5, 0.866)   C. U(2, 5)   D. U(3.5, 3.5)

Questions 20 – 21 refer to the following:
The college administrator believes that at most 60% of students pass statistics. A random sample of 150 students shows that 111 passed their statistics course.

20. Which of the following is the appropriate graph for this hypothesis test?
   A. ![Graph A]  B. ![Graph B]  C. ![Graph C]  D. ![Graph D]

21. Find the best point estimate for the proportion of all students who pass their statistics course.
   A. 0.60
   B. 0.46
   C. 0.74
   D. Unable to determine because we are not told what confidence level to use.