

**STATISTICS 2023**

**NAME, PRINT IN INK** \_\_\_\_\_

**EXAM TWO**

**SIGNATURE, IN INK** \_\_\_\_\_

**SPRING 2008**

**CWID, IN INK** \_\_\_\_\_

**Once this exam is graded and returned to you retain it for grade verification.**

**TRUE OR FALSE. Answer with a capital T or F.**

**4 points each)**

\_\_\_\_\_ 1. A discrete random variable is a variable that only has probability on intervals of values and no probability at all on specific values.

\_\_\_\_\_ 2. A probability density function is a function that indicates how much of the mass of the unit probability is assigned to each value of a discrete random variable.

\_\_\_\_\_ 3. The standard normal distribution is a symmetric, bell-shaped distribution which always has a standard deviation equal to zero and a mean equal to one.

\_\_\_\_\_ 4. The Central Limit Theorem states that regardless of the shape of the original population if samples of adequate size are repeatedly drawn then the resulting sample mean values are approximately normally distributed.

\_\_\_\_\_ 5. The mean of the sample means, which result from repeated sampling, is always equal to the mean of the population from which the random samples were drawn.

**STANDARD NORMAL DISTRIBUTION QUESTIONS.**

**STATE THE ANSWER State the answer on the line provided.**

**4 points each)**

\_\_\_\_\_ 6. Find  $z_0$  if  $P(Z > z_0) = 0.9909$ .

\_\_\_\_\_ 7. Find the  $P(1.04 < Z < 2.54)$ .

\_\_\_\_\_ 8. What is the  $P(Z > 2.12)$ ?

\_\_\_\_\_ 9. Find  $z_0$  if  $P(Z > z_0) = 0.025$ .

STATE THE ANSWER. State the answer on the line give

(4 points each)

\_\_\_\_\_ 10. In an investment that has .50 probability of making \$100, .25 probability of making \$125, .15 probability of making \$150, and the remaining probability on making \$200, what is the expected earning from this investment?

\_\_\_\_\_ 11. A gambler has the probability 0.42 to win a game. If this game is played seven times what is the probability that the gambler will win fewer than 2 times? Round your answer to three digits past the decimal.

\_\_\_\_\_ 12. Sixty-Five percent of all households in the US own more than 2 cars. Suppose twenty households have been randomly selected. What is the probability that at least eight of the households have more than 2 cars? State the answer with four digits past the decimal.

\_\_\_\_\_ 13. On average, 1.8 customers enter the bookstore in Student Union every 10 minutes. What is the probability that at most three customers will enter the bookstore in 10 minutes? State the answer with four digits past the decimal.

\_\_\_\_\_ 14. On average, 4.8 students enter a certain school library every minute. What is the probability that 7 or 8 students will enter the library in a randomly chosen minute? Round your answer to three digits past the decimal.

**STATE THE ANSWER. State the answer on the line given.**

**(4 points each)**

**Suppose the research department** of a steel manufacturer believes that one of the company's rolling machines is producing sheets of steel of varying thickness. The thickness is a uniform random variable with values between 140 and 200 millimeters. Use this information to answer questions 15-17.

\_\_\_\_\_ 15. What is the mean thickness of the sheets produced by this machine?

\_\_\_\_\_ 16. Sheets with thickness less than 155 millimeters must be scrapped because they are unacceptable to buyers. What is the probability that sheets produced by this machine have to be scrapped?

\_\_\_\_\_ 17. If the company only wants to scrap the thinnest 12% of the sheets produced, then the sheets thinner than what thickness should be scrapped?

**A new wheat cultivar produces** a yield that is normally distributed with a mean of 62 bushels per acre with a standard deviation of 18 bushels per acre. Use this for questions 18-21.

\_\_\_\_\_ 18. Based on the distribution of wheat yield described above what is the probability that the yield will exceed 35 bushels per acre?

\_\_\_\_\_ 19. Based on the distribution of wheat yield described above what is the value of the yield that is only exceeded by 0.025 of the yields?

\_\_\_\_\_ 20. What is the probability that the wheat yield is greater than 80, but less than 87.2 bushels per acre?

\_\_\_\_\_ 21. Thirty three percent of the wheat yields are less than what value? That is, find the 33<sup>rd</sup> percentile of the wheat yields.

STATE THE ANSWER. State the answer on the line given.

(4 points each)

Assume 100 observations were randomly drawn from a population of investment returns with a mean of 1,650 dollars and a standard deviation of 50 dollars. Use this information to answer the remaining questions.

\_\_\_\_\_ 22. What is the numerical value of the mean of all possible sample means that would result from the above situation?

\_\_\_\_\_ 23. What is the numerical value of the standard deviation of all possible sample means that would result from the above situation?

\_\_\_\_\_ 24. Only 0.25% (or 0.0025) of the sample means that result from the above sampling situation will be less than what value?

\_\_\_\_\_ 25. What is the probability that the sample mean that results from the above situation will be between 1,647 and 1,657 dollars?