

STATISTICS 2023

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

EXAM TWO

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

FALL 2012

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 has probability only on the specific values of the variable.

\_\_\_\_\_ 2. The expected value of a variable is mean of the variable and indicates the average of the variable in the long run.

\_\_\_\_\_ 3. When the probability distribution of a continuous random variable is displayed in a graph, it is the height of the bar, or line, at each of the values of the variable that indicates the probability.

\_\_\_\_\_ 4. The Normal probability distribution function is left skewed, right skewed or symmetric depending on the values of the variance and the standard deviation.

\_\_\_\_\_ 5. The area under a probability density function indicates the probability for an interval of values for a discrete random variable.

Z-table Questions. Write your answer on the line.

(4 points each)

\_\_\_\_\_ 6. What is  $z_0$ , such that  $P(Z < z_0) = 0.2676$ ?

\_\_\_\_\_ 7. What does  $P(0.35 < Z < 1.87)$  equal?

\_\_\_\_\_ 8. What does  $P(Z > 1.68)$  equal?

\_\_\_\_\_ 9. Assume that a discrete random variable has five possible values, 10, 12, 14, 16, and 28. If the probability on each of the first two values, 10 and 12, is 0.125 and the remaining probability is divided equally for the other three values of the variable, 14, 16, and 28, then what is the expected value of such a random variable?

\_\_\_\_\_ 10. Consider a lottery game where the players either win \$0, \$2, or \$1500. If the probability of winning nothing is 0.99 and the probability of winning \$2 is 0.009. What is the standard deviation of the winnings of such a lottery game? Round your answer to two digits past the decimal.

\_\_\_\_\_ 11. A machine that produces parts for automobile engines is malfunctioning and producing 15% defectives. The defective and non-defective parts are produced by the machine in a random manner. If the next 8 parts are tested, what is the probability that no more than 2 parts are defective? State your answer with four digits past the decimal.

\_\_\_\_\_ 12. A lawyer estimates that 38% of the cases in which she represented the defendant were won. If the lawyer is presently representing 10 defendants in different cases, what is the probability that 5 of the cases will be won? Round your answer to five digits past the decimal.

\_\_\_\_\_ 13. The safety supervisor at a large manufacturing plant knows that the average number of industrial accidents per month is 2.6. What is the probability of fewer than 3 accidents occurring next month? State your answer with four digits past the decimal.

\_\_\_\_\_ 14. The parts department of an automotive dealership sends out an average of 8.75 special orders daily. What is the probability that for any day, the number of special orders sent out will be exactly 15? Round your answer to five digits past the decimal.

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

(4 points each)

**On IRS tax forms** the instructions indicate that it is appropriate to round all entries to whole dollars. The rounding error that results from this is uniformly distributed between the values of -50 cents and +50 cents. Use this information to work the next two problems and consider the problem with cents as the unit.

\_\_\_\_\_ 15. What is the probability that the rounding error will be more than 36 cents from the mean? That is, what is the probability that the rounding error will be outside of an interval that is the mean plus and minus 36 cents?

\_\_\_\_\_ 16. Fifteen percent of the time the rounding error exceeds what positive number of cents?

**Light bulbs manufactured** by the Acme Corporation are rated to last 320 days on average with a standard deviation of 50 days. Assume that bulb life is normally distributed. Use this information to answer the remainder of questions on this page.

\_\_\_\_\_ 17. What is the probability that a randomly chosen bulb will last more than 360 days?

\_\_\_\_\_ 18. What is the probability that a randomly chosen bulb will last more than 190 days but less than 280 days?

\_\_\_\_\_ 19. One and one-half percent of the time the life of this type of bulb is less than how many days?

\_\_\_\_\_ 20. What is the 67<sup>th</sup> percentile of the variable, bulb life?

\_\_\_\_\_ 21. State the interval centered on the mean of bulb life times that contains 95% of the values of the variable.

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

(4 points each)

**In order to analyze a new chemical form of asphalt**, samples of 36 observations were repeatedly drawn from the asphalt mixture at a large chemical factory. The melting temperature of the asphalt is known to be 290 degree Fahrenheit ( $290^{\circ}\text{F}$ ) with a standard deviation of 18 degree Fahrenheit ( $18^{\circ}\text{F}$ ). Use this information to address the questions on this page.

\_\_\_\_\_ 22. What is the probability that the sample mean from the above sampling situation will be greater than  $296^{\circ}\text{F}$ ?

\_\_\_\_\_ 23. Thirty-three percent of the sample means that result from the above sampling situation will be more than what value?

\_\_\_\_\_ 24. What is the probability that the sample mean that results from the above sampling situation will be between  $285.98^{\circ}\text{F}$  and  $293.78^{\circ}\text{F}$ ?

\_\_\_\_\_ 25. Would a sample mean of at least  $292^{\circ}\text{F}$  be likely to occur from the above sampling situation, if in fact the mean melting temperature of the asphalt was  $290^{\circ}\text{F}$ ? Answer likely, or unlikely.