

Name, I.D. #, and Date: _____

Instructions: Mark your final answers on your Scantron form. Your responses on your Scantron form will determine your score. **No electronics other than the calculators provided.** Use the test, formula sheet, and z-tables for writing. You must return them with the test. Put your name, I.D. #, and date on them. Each problem is worth 2 points. Use the pencil provided.

Answers in decimals are rounded to the ten-thousandths place equivalent to the fourth digit to the right of the decimal point unless expressed otherwise.

1.) Flip a fair coin three times. What is the probability the first flip resulted in heads given a total of one head on all three flips?

- a.) $\frac{3}{8}$ b.) $\frac{2}{3}$ c.) $\frac{1}{3}$ d.) $\frac{1}{2}$ e.) None of these.

2.) A biased coin, twice as likely to come up heads as tails, is tossed once. If it shows heads a chip is drawn from an urn I which contains 3 white chips and 4 red chips; if it shows tails a chip is drawn from urn II, which contains 6 white chips and 3 red chips. Given that a white chip was drawn, what is the probability that the coin came up tails?

- a.) $\frac{7}{16}$ b.) $\frac{7}{9}$ c.) $\frac{32}{63}$ d.) $\frac{2}{9}$ e.) None of these.

3.) A potential customer for an \$85,000 fire insurance policy possesses a structure in an area that according to experience, may sustain a total loss in a given year with probability 0.001 and a 50% loss with probability 0.01. Ignoring all other partial losses, what premium should the insurance company charge for a yearly policy in order to break even on all \$85,000 policies in this area?

- a.) \$425 b.) \$510 c.) \$1275 d.) \$340 e.) None of these.

4.) A warehouse contains ten printing machines, four of which are defective. A company selects five of the machines at random, thinking all are in working condition. What is the probability that all five of the machines are nondefective?

- a.) 0.0714 b.) 0.0238 c.) 0.6000 d.) 0.0595 e.) None of these.

5.) The voltage across an industrial surface mount power resistor is a random variable V . This random variable V is uniform on the interval $[5, 10)$ or equivalently it is uniform between 5 and 10 volts. The power in watts dissipated by such a resistor is given by the formula $P = (V^2/r)$ where P is the power, V^2 is the voltage squared, and r is the resistance of the resistor, $r = 1000 \Omega$. Determine the probability that the power dissipated by the resistor is less than 0.05 watts by determining the density function for the random variable P and integrating it between the appropriate limits. (The four answers below are in watts.)

- a.) 0.0375 b.) 0.1283 c.) 0.1581 d.) 0.2534 e.) None of these.

6.) Roll a fair die repeatedly until it lands with a six face up. What is the probability the 6 occurs on the fourth roll?

- a.) 0.3858 b.) 0.1667 c.) 0.0965 d.) 0.3287 e.) None of these.

7.) Choose a point at random on the line with endpoints A and B. What is the probability the point is closer to A than B?

- a.) 50% b.) 75% c.) 25% d.) 100% e.) None of these.

8.) The average number of calories in a 1.5-ounce chocolate bar is 225. The calories random variable is normally distributed with a standard deviation of 10 calories. What is the probability that a randomly selected candy bar will have between 200 and 220 calories?

- a.) 0.3085 b.) 0.3487 c.) 0.9332 d.) 0.3023 e.) None of these.

9.) Two out of five adult smokers acquired the habit by age 14. If 400 smokers are randomly selected, find the probability that 170 or fewer acquired the habit by age 14. {Hints: Use DeMoivre-Laplace to solve this problem, Use a continuity correction, and calculate the standard deviation to at least three decimal places (thousandths).}

- a.) 0.8665 b.) 0.8641 c.) 0.1359 d.) 0.8577 e.) None of these.

10.) Three firms using the same auditor independently and randomly select a month in which to conduct their annual audits. What is the probability that all 3 months are different?

- a.) 0.0006 b.) 0.5729 c.) 0.3721 d.) 0.7639 e.) None of these.

11.) Dietary guidelines for Americans states that adults need 2250 calories per day. The average vegan consumes 1500 calories per day with a standard deviation of 250 calories. This calories variable is normally distributed. What are the minimum and maximum number of calories a vegan can consume and remain within the middle 95% of daily calorie intake for vegans? Answers below are in the form (min, max).

- a.) (1087 cal, 1913 cal) b.) (1200 cal, 1700 cal) c.) (1010 cal, 1990 cal) d.) (1250 cal, 1750 cal) e.) None of these.

12.) For the population data set {1, 4, 1, 4, 5, 3, 1} what is the mean, median, mode, and standard deviation in the order (mean, median, mode, standard deviation) with mean to one decimal place and standard deviation to two decimal places.

- a.) (2.7, 1, 3, 2.50) b.) (2.7, 3, 1, 1.58) c.) (3, 3, 1, 2.51) d.) (2.7, 3, 1, 2.50) e.) None of these.

13.) In a statistics class there are 18 juniors and 10 seniors; 6 of the seniors are females and 12 of the juniors are males. If a student is selected at random, find the probability of selecting a junior or a female.

- a.) $\frac{6}{7}$ b.) $\frac{9}{14}$ c.) $\frac{5}{14}$ d.) $\frac{3}{7}$ e.) None of these.

14.) Fifty-three percent of all persons in the U.S. population have at least some college education. Choose 10 persons at random. Find the probability that exactly one-half have some college education

- a.) 0.2417 b.) 0.3481 c.) 0.0001 d.) 0.2461 e.) None of these.

15.) In a particular body of water the probability a random trout is infected with parasites is 3%. If a person catches 10 trouts, what is the probability at least one is infected with parasites?

- a.) 1.0000 b.) 0.7374 c.) 0.2626 d.) 0.3452 e.) None of these.