

Midterm exam essay



**ASSIGN
BUSTER**

1 STAT 1770 MIDTERM-2 Date: March 19, 2010 Time: 12 30- 14 30

Instructions 1. This is a closed book exam. Name: _____ I. D. #: _____
2. You are permitted to use a non programmable calculator approved by the instructor. 3. There are 31 multiple-choice questions in the part A of this exam. For each question exactly one of four answers provided is correct. For each multiple-choice question, circle one of the letters (a)-(d) corresponding to your chosen answer and record it in the answer sheet. The answers are rounded for calculation questions. Choose the best answer. . All answers will be graded right or wrong (no partial credit) in this part. Each single question is worth 1 point. 5. In part B, there are 5 long answer/short answer questions. Give in the answers in the space provided. (Your answers should be corrected to 4 decimal places). 6. There are 11 pages in the exam. 7. The exam is graded out of 62 points. 2 PART A MULTIPLE CHOICE

QUESTIONS (31 Points) 1. Which method of data collection is involved when a researcher counts and records the number of students wearing backpacks on campus in a given day? a. An experiment. b. A survey. . Direct observation. d. None of these choices. 2. A marketing research firm selects a random sample of adults and asks them a list of questions regarding their beverage preferences. What type of data collection is involved here? a. An experiment. b. A survey. c. Direct observation. d. None of these choices. 3. A researcher conducts a study where she divides subjects into two groups, gives each group a certain treatment, and records their responses. What type of data collection is being used here? a. An experiment. b. Direct observation. c. A survey. d. A census. 4.

When the population is divided into mutually exclusive sets, and then a simple random sample is drawn from each set, this is called: a. simple random sampling. b. stratified random sampling. c. cluster sampling. d. selection bias. 5. To give away a door prize, the host of a dinner party put each person's name into a hat, mixed them up, and selected one name.

What sampling method was used? a. Simple random sample b. Systematic sample c. Stratified random sample d. Cluster sample 6. The collection of all possible outcomes of an experiment is called: a. a simple event b. a sample space c. a sample d. a population 3 7.

If event A and event B cannot occur at the same time, then A and B are said to be a. mutually exclusive b. independent c. collectively exhaustive d. None of these choices. 8. The probability of the intersection of two events A and B is denoted by $P(A \text{ and } B)$ and is called the: a. marginal probability b. joint probability c. conditional probability of A given B d. conditional probability of B given A 9. If the outcome of event A is not affected by event B, then events A and B are said to be a. mutually exclusive b. independent c. collectively exhaustive d. None of these choices. 10. If A and B are independent events with $P(A) = 0.4$ and $P(B) = 0.6$, then $P(A \text{ and } B) =$ a. 0.76 b. 1.00 c. 0.24 d. 0.20 11. If A and B are independent events with $P(A) = 0.2$ and $P(B) = 0.6$, then $P(A \text{ OR } B) =$ a. 0.62 b. 0.12 c. 0.60 d. 0.68 12. If A and B are independent events with $P(A) = 0.05$ and $P(B) = 0.65$, then $P(A \text{ ? } B) =$ a. 0.05 b. 0.0325 c. 0.65 d. 0.8 13. If A and B are mutually exclusive events with $P(A) = 0.3$ and $P(B) = 0.5$, then $P(A \text{ and } B) =$ a. 0.30 b. 0.15 c. 0.00 d. 0.20 14. If A and B are mutually exclusive events with $P(A) = 0.3$ and $P(B) = 0.5$, then $P(A \text{ OR } B) =$ a. 0.00 b. 0.15 c. 0.8 d. 0.2 15. Events A and B are

mutually exclusive with $P(A) = 0.$ and $P(B) = 0. 2.$ Then, $P(Bc) =$ a. $0. 00$ b. $0. 06$ c. $0. 7$ d. $0. 8$ 16. An experiment consists of four outcomes with $P(E1) = 0. 2,$ $P(E2) = 0. 3,$ and $P(E3) = 0. 4.$ The probability of outcome $E4$ is a. $0. 500$ b. $0. 024$ c. $0. 100$ d. $0. 900$ 17. If $P(A) = 0. 58,$ $P(B) = 0. 44,$ and $P(A \text{ and } B) = 0. 25,$ then $P(A \text{ OR } B) =$ a. $1. 02$ b. $0. 77$ c. $0. 11$ d. $0. 39$ 18. If $P(A) = 0. 50,$ $P(B) = 0. 60,$ and $P(A \text{ and } B) = 0. 30,$ then events A and B are a. mutually exclusive events b. not independent events c. independent events d. not enough information is given to answer this question 19. If $P(A) = 0. 62,$ $P(B) = 0. 47,$ and $P(A \text{ OR } B) = 0. 8,$ then $P(A \text{ and } B) =$ a. $0. 2914$ b. $1. 9700$ c. $0. 6700$ d. $0. 2100$ 20. If a penny is tossed three times and comes up heads all three times, the probability of heads on the fourth trial is a. smaller than the probability of tails b. larger than the probability of tails c. $1/16$ d. $1/2$ 21. If $P(A) = 0. 50,$ $P(B) = 0. 40,$ then, and $P(A \text{ OR } B),$ then $P(B ? A) =$ a. $0. 02$ b. $0. 03$ c. $0. 04$ d. $0. 05$ 22. If A and B are independent events with $P(A) = 0. 38$ and $P(B) = 0. 55,$ then $P(A ? B) =$ a. $0. 209$ b. $0. 000$ c. $0. 550$ d. $0. 38$ 23. If A and B are mutually exclusive events with $P(A) = 0. 295,$ $P(B) = 0. 32,$ then $P(A ? B) =$ a. $0. 0944$ b. $. 6150$ c. $1. 0000$ d. $0. 0000$ 24. If a six sided die is tossed two times, the probability of obtaining two "4s" in a row is a. $1/6$ b. $1/36$ c. $1/96$ d. $1/216$ 25. A random variable that can assume only a finite number of values is referred to as a(n) a. infinite sequence b. finite sequence c. discrete random variable d. discrete probability function 26. A probability distribution showing the probability of x successes in n trials, where the probability of success does not change from trial to trial, is termed a a. uniform probability distribution b. binomial probability distribution c. hypergeometric probability distribution d. normal probability distribution 27. Variance is a. a measure of the average, or central value of a random

variable b. a measure of the dispersion of a random variable c. the square root of the standard deviation d. the sum of the squared deviation of data elements from the mean

29. The number of customers that enter a store during one day is an example of a. a continuous random variable b. a discrete random variable c. either a continuous or a discrete random variable, depending on the number of the customers d. either a continuous or a discrete random variable, depending on the gender of the customers

The number of electrical outages in a city varies from day to day. Assume that the number of electrical outages (x) in the city has the following probability distribution.

x	0	1	2	3
$f(x)$	0.80	0.15	0.04	0.01

The mean and the standard deviation for the number of electrical outages (respectively) are a. 2.6 and 5.77 b. 0.26 and 0.577 c. 3 and 0.01 d. 0 and 0.8

Exhibit 1-1
Forty percent of all registered voters in a national election are female. A random sample of 5 voters is selected.

30. Refer to Exhibit 1-1. The probability that the sample contains 2 female voters is a. 0.0778 b. 0.7780 c. 0.5000 d. 0.456

31. Refer to Exhibit 1-1. The probability that there are no females in the sample is a. 0.0778 b. 0.7780 c. 0.5000 d. 0.3456

PART B
SHORT ANSWER QUESTIONS (31 Points)

1. Assume you have applied for two scholarships, a Merit scholarship (M) and an Athletic scholarship (A). The probability that you receive an Athletic scholarship is 0.18. The probability of receiving both scholarships is 0.11. The probability of getting at least one of the scholarships is 0.3. (9 points)

a. What is the probability that you will receive a Merit scholarship? (1 point)

b. Are events A and M mutually exclusive? Why or why not?

Explain. (2 points) c. Are the two events A, and M, independent? Explain, using probabilities. (2 points) 8 d. What is the probability of receiving the Athletic scholarship given that you have been awarded awarded the Merit scholarship? (2 points) e. What is the probability of receiving the Merit scholarship given that you have been awarded the Athletic scholarship? (2 points) 2. There are three approaches to determining the probability that an outcome will occur: classical relative frequency, and subjective. For each situation that follows, determine which approach is most appropriate with your reasoning. (2 points) a.

An American will win the French Open Tennis Tournament next year. (1 point) b. The probability of getting any single number on a balanced die is $1/6$. (1 point) 9 3. Let X represent the number of times a student visits a bookstore in a one month period. The random variable X is discrete probability distribution with mean $\mu = 1.85$ and the standard deviation $\sigma = 0.792$ (4 points) a. Find the mean, variance and the standard deviation of random variable Y, where $Y = 2X + 1$. (4 points) 4. An official from the securities commission estimates that 75% of all investment bankers have profited from the use of insider information.

Assume that 15 investment bankers are selected at random from the commission's registry. (10 points) a. Find the probability that at most 10 have profited from insider information. (2 points) 10 b. Find the probability that at least 6 have profited from insider information. (2 points) c. Find the probability that all 15 have profited from insider information. (2 points) d. What is the expected number of investment bankers who have profited from the use of insider information? (2 points) e. Find the variance and standard

deviation of the number of investment bankers who have profited from the use of insider information. (2 points)

11.6. A human gene carries a certain disease from the mother to the child with a probability of 0.30. That is, there is a 30% chance that the child gets infected with the disease. Suppose a female carrier of gene has four children. Assume that the infections are independent of one another. (6 points)

a. What is the probability all of the four children gets infected? (1 point)

b. What is the probability that none of the children gets infected? (1 point)

c. What is the probability that at least one gets infected? (2 points)

d. What is the probability that at least one of the children does not get infected? (2 points)