

Contemporary Mathematics

Math 1030

Sample Exam I – Chapters 13-15

Time Limit: 90 Minutes No Scratch Paper Calculator Allowed: Scientific

Name: _____

The point value of each problem is in the left-hand margin. You must show your work to receive any credit, except on problems 1 & 2. Work neatly.

(10) 1. Fill in the blanks.

- (a) The probability of a ball chosen in random, from a collection of 7 balls of which exactly 4 are red, being red is _____ .
- (b) The value of $P(8, 5)$ is _____ .
- (c) The median the data 2, 3, 5, 5, 7, 8, 10, 11 is _____ .
- (d) If the odds against event E are 7 to 2, then $P(E) =$ _____ .
- (e) The first quartile of the data 2, 4, 6, 6, 8, 9, 9, 10 is _____ .

(3) 2. True or False.

- () (a) Suppose a fair coin in flipped 101 times. Let A be the event that each of the first 100 flips results in a head. Let B be the event that the 101st flip results in a tail. Events A and B are independent.
- () (b) Suppose a fair coin is flipped 3 times. Let E be the event that two heads are observed. Let F be the event that at least one tail is observed. Events E and F are mutually exclusive.
- () (c) The mode of a data set is the number or numbers which appear most frequently, if any.

(6) 3. Consider a group of 6 people.

- (a) In how many ways can they be arranged in a row?

- (b) In how many ways can we pick a committee of size 3 from this group?

- (c) In how many ways can a president and a vice-president be chosen from this group?

- (10) 4. The table below represents the educational attainment in year 2000 of adults 25 years and older who are residents of United States. Construct a relative frequency bar graph of this data. **Show your work.**

Educational attainment	Number of Adults
Less than 9th grade	12,327,601
9th-12th grade, no diploma	20,343,848
High school diploma	52,395,507
Some college, no degree	36,453,108
Associate's degree	11,487,194
Bachelor's degree	28,603,014
Graduate/professional degree	15,930,061
Total	177,540,333

- (10) 5. Find the first quartile, median and third quartile of the following data. State its five-number summary and construct its box plot. **Show your work.**

3, 9, 10, 2, 6, 7, 5, 8, 6, 6, 4, 4, 9, 22

- (7) 6. The following is a sample of salaries for ten players in NBA for the 2000-2001 season, in thousands of dollars.

\$19,290 , \$10,130 , \$6,500 , \$4,800 , \$3,400 , \$3,380 , \$2,250 , \$1,760 , \$1,200

Find the sample mean and standard deviation of this data. **Show your work.**

- (8) 7. The grade appeal process at a university requires that a jury be structured by selecting five individuals randomly from a pool of eight students and ten faculty. How many juries consisting of two students and three faculty can be selected? **Show your work.**

- (8) 8. What is the probability of getting a spade flush from a standard 52-card deck of cards? (A standard deck consists of 13 hearts, diamonds, clubs and spades. A spade flush is achieved by being dealt, without replacement, 5 consecutive spade cards.) Note: You must explain your work through words and/or formula(s).

- (10) 9. A bag contains 5 red balls numbered one through five and 6 blue balls numbered one through six. What is the probability that a ball chosen in random is a one or blue? Note: You must explain your work through words and/or formula(s).
- (10) 10. A basketball player can make 80% of her free throws. Suppose she attempts 5 free throws, what is the probability that misses one or more free throws? Note: You must explain your work through words and/or formula(s).

- (10) 11. Suppose an AutoZone store receives a shipment of size 100 alternators from the manufacturer. The store manager checks 3 alternators in random and if one or more are defective, then shipment is rejected. If there are four defective alternators in the shipment, what is the probability of the shipment being rejected? Note: You must explain your work through words and/or formula(s).
- (8) 12. It costs \$5 to play a dice game. In this game you roll a fair six-sided die. If you roll a 1, 2, or 3 you will be paid \$1. If you roll a 4 or 5, you will be paid \$2. And if you roll a 6 you will be paid \$11. What is your expected payoff in this game? If you play this game a lot, do you expect to make or lose money? Why? Note: State the appropriate formula and show your work.

Formulas

$$P(n, r) = \frac{n!}{(n-r)!} \quad ; \quad C(n, r) = \frac{n!}{r!(n-r)!}$$

$$P(E') = 1 - P(E)$$

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

$$P(F|E) = \frac{P(F \cap E)}{P(E)} \quad ; \quad P(F \cap E) = P(F|E)P(E)$$

$$\text{Expected Value} = P_1V_1 + P_2V_2 + \cdots + P_nV_n$$

$$\bar{x} = \frac{\sum x_i}{n}, \quad s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1} = \frac{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}{n-1}$$

$$\bar{x} = \frac{\sum x_i f_i}{\sum f_i}, \quad s^2 = \frac{\sum (x_i - \bar{x})^2 f_i}{\sum f_i - 1}$$

$$CV = \frac{s}{\bar{x}} \times 100\%$$