

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

- ❖ Write your name below on the space provided.
- ❖ This test has a total of 5 pages.
- ❖ Work the problem in the space provided. If you need more space, write on the back of the test.
- ❖ To insure maximum credit, show your work. In general, full credit will not be given for unsupported answers.
- ❖ Look only at your test. Do not give me the impression that you are cheating.
- ❖ Draw a leaf on this page for something extra.
- ❖ Be sure to write neatly in pencil. If I cannot read what was written, do not expect the problem to be graded.
- ❖ If you finish early, go over the test again.

Good luck!

Number	Maximum	Score
1	6	
2	18	
3	4	
4	16	
5	12	
6	6	
7	4	
8	8	
9	3	
10	9	
11	8	
12	6	
13	EC 4	
Total	100	

Name \_\_\_\_\_

CIRCLE FINAL ANSWERS

write probabilities as a reduced fraction unless otherwise directed

1) (3 points each) Consider a family with 3 children.

- a) Write the sample space showing the different arrangements of genders for the youngest child, middle child, and oldest child.      b) What is the probability of having at least one girl?

2) (3 points each) Consider a standard deck of cards.

- a) How many Face Cards are there?      b) What is the probability of picking a Face Card?

- c) How many Clubs are there?      d) What is the probability of picking a Club?

- e) How many cards are Club Face Cards?      f) What is the probability of picking a face card **or** a Club?

3) (4 points) At Chili's, you can pick one of 5 appetizers, one of 10 main dishes, and one of 6 desserts. How many complete meals can be made from this menu?

4) (4 points each) Dario has a box of chocolates. There are 20 in total of which 9 are dark, 7 are salted caramel, and 5 are milk. Picking a piece at random....

- a) What is the probability that the piece is dark?      b) What are the odds the piece is dark?

- c) What is the probability that the piece is not milk?      d) What are the odds the piece is not milk?

- 5) (4 points each) In a room of 40 people, 15 saw the movie *Poor Things* ( $PW$ ), 26 people saw the movie *Dune Part 2*, and 10 people saw both. Picking a person at random, what is the probability that they:
- a) Saw  $PW$  or *Dune*?      b) Saw  $PW$  given they saw *Dune*?      c) Saw *Dune* given they didn't see  $PW$ ?
- 6) (3 points each) Three cards are picked, one at a time, from a standard deck of cards. Find the probability that you pick a Heart first, a Diamond second, and another Heart third if...
- a) The cards are not replaced:      b) The cards are replaced:
- 7) (4 points) How many distinct permutations can be formed using all of the letters in the word SUCCESSES?
- 8) (4 points each) A room is full of 12 artists, 7 financial advisors, 8 engineers, and 4 less scary clowns. A committee is to be formed that contains 12 people to rid the world of the Monday blues.
- a) How many ways can you pick exactly 3 people from each group?
- b) What is the probability that you pick exactly 3 people from each group?
- 9) (3 points) Martha and Stewart are having a party where they invited 3 women and 3 men. Assuming everyone arrives at a different time, what is the probability that the women are the first three guests and the men are the last three guests?

10) (3 points each) In February 2024, it was found that 65% of internet users choose Google Chrome. Picking 5 internet users, find the probability, written as a percent rounded to four decimal places, that...

a) They all use Google Chrome:

b) Exactly 3 use Google Chrome:

c) At least 3 of them use Google Chrome:

11) A raffle is being held where 1,000 tickets were sold for \$20 each. One first place ticket brings in a prize of \$500. Two second place prizes are for \$200 each. Five third place prizes are for \$100 each. Rounding answers (in dollars) to two decimal places...

a) (6 points) What is the expected net value of the game?

b) (2 points) Is the game fair to play? Why or why not?

12) (3 points each) Short Answer: When writing the answer to a question that give the following directions, how can you write your answer?

a) "What is the probability that..."

b) "What are the odds that..."

13) Extra credit: Using the language of the problem, explain the 4 reasons why #10 was a binomial probability:

1.

2.

3.

4.

# CHAPTER 3 FORMULAS

Probability to Odds for an Event:  $P(E)$  to  $P(\text{not } E)$  reduced

Probability to Odds against an Event:  $P(\text{not } E)$  to  $P(E)$  reduced

Odds to Probability for event E  $a$  to  $b$  imply  $P(E) = \frac{a}{a+b}$

Odds to Probability against event E  $a$  to  $b$  imply  $P(E) = \frac{b}{a+b}$

Addition Formula:  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Conditional Probability:  $P(E | F) = \frac{P(E \cap F)}{P(F)}$

Product Formula:  $P(E \cap F) = P(F) \times P(E | F)$

Complement Formula:  $P(\text{not } E) = 1 - P(E)$  also called  $P(\overline{E})$  or  $P(E')$