

# Math 4740 - Fall 2023 - Test 1

Name: \_\_\_\_\_

Score	
1	
2	
3	
4	
5	
Total	

1. [12 points - 6 each]

(a) Suppose that a license plate consists of three numbers (taken from  $0 - 9$ ), followed by two letters (taken from  $A - Z$ ), followed by one symbol (where the symbol is chosen from either a circle, a square, or a star. How many different license plates are there? Two example license plates are  $058JE\star$  and  $567KC\Box$  (There are 26 letters in the alphabet.)

(b) How many permutations are there of the letters  $a, b, c, d, e$  where the permutation must begin with  $a$  and end with  $c$ . An example of such a permutation is  $abdec$ .

2. [12 points - 4 each] Suppose you want to model the experiment of flipping a coin 3 times in a row.

(a) Write down the elements of a sample space  $S$  for such an experiment. List all of the elements of  $S$ .

(b) Let  $E$  be the event where at most one heads occur. Let  $F$  be the event where at exactly two tails occur. List the elements of  $E$  and  $F$  and find  $E \cap F$  and  $E \cup F$  and  $\overline{F}$ .

(c) Calculate the probability of  $E$  and the probability of  $F$ .

3. [12 points - 6 each]

(a) Suppose that four 8-sided dice are thrown. What is the probability that you get exactly two 3's?

(b) If a 6-sided die is rolled four times, what is the probability that a 3 occurs at least once in the four rolls?

4. [12 points - 6 each] Suppose a dealer deals you 3 cards from a standard 52 card deck.

(a) What is the size of the sample space for this experiment?

(b) What is the probability that you get a pair and another card that isn't the same face value.

Two examples are:

Example 1: 6♠, 6♠, K♣

Example 2: 5♦, 5♣, 2♦

5. [12 points - 6 each] Consider a box with three black balls labeled 1, 2, 3; three red balls labeled 4, 5, 6; and four orange balls labeled 7, 8, 9, 10. Suppose you randomly draw two balls from the box. You grab them at the same time, so order doesn't matter. For example, maybe you pick black ball 2 and red ball 6.

(a) What is the sample size of this experiment?

(b) What is the probability that you get one black ball and one orange ball?

(c) What is the probability that both of the balls have an odd number on them?