

Math 4740 - Spring 2025 - Test 1

Name: _____

Score	
1	
2	
3	
4	
5	
6	
Total	

1. [12 points - 4 each] Suppose you want to model the experiment of rolling two 3-sided dice. Here the dice each have sides 1,2,3 and each side is equally likely.

(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 the first die is a 2. Let F be the event where the sum of the dice is 5. List the elements of E and F and find $E \cap F$ and $E \cup F$ and \overline{E} .

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

2. [12 points - 6 each]

(a) Suppose that five 6-sided dice are thrown. What is the probability that you get exactly three 6's?

(b) Suppose a coin is tossed 8 times. What is the probability that at least 1 heads occurs?

3. [12 points - 6 each] Suppose a dealer deals you 4 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 are dealt a three-of-a-kind?

Here a three-of-a-kind is where you get three cards with the same face value, and then one more card that has a different face value. Two examples of a three-of-a-kind are:

Example 1: $6\spadesuit, 6\diamondsuit, 6\diamondsuit, A\spadesuit$

Example 2: $2\diamondsuit, 2\spadesuit, 2\heartsuit, J\heartsuit$

4. [12 points - 4 each] Consider a bag with 2 red balls and 6 green balls. Suppose you choose 2 balls from the bag (order doesn't matter).

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

(b) What is the probability that you choose 1 red ball and 1 green ball?

(c) What is the probability that you chose 2 green balls?

5. [10 points] Suppose there is a weighted coin with sides H and T . The probability of getting H is $1/4$ and the probability of getting T is $3/4$. Suppose you do the following: You flip the coin. If you get heads H , then you roll a 4-sided die. If you get tails T , then you roll a 6-sided die.

(a) Draw the probability tree for this experiment.

(b) What is the probability that you roll a 4 on the dice?

6. [10 points] Suppose you are dealt 1 card from a standard 52-card deck. Let E be the event that the suit of the card is a heart \heartsuit . Let F be the event that the face value of the card is King K . Calculate the conditional probability $P(F|E)$.