Math 4740 - Fall 2023 - Test 2

Name:_____

Score	
1	
2	
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Total	

1. [10 points] Suppose you roll two 4-sided dice. Let E be the event that the sum of the dice is 6. Let F be the event that at both of the dice are even. Are E and F independent? Show why or why not.

2. [10 points] Suppose you roll two 8-sided dice, one green and one red. Suppose that you know that the sum of the dice is 7. Given this, what is the probability that the red dice is a 2 ?

3. [10 points] Suppose that there are 2 bags. Bag 1 contains 3 white balls and 3 red balls. Bag 2 contains 4 white balls and 2 red balls. Suppose you do this experiment. You flip a coin. If tails comes up then you pick a ball from bag 1. If heads comes up then you pick a ball from bag 2.

(a) Draw the probability tree for this experiment.

(b) When you do the above experiment, what is the probability of picking a red ball?

(c) When you do the above experiment, what is the probability of picking a white ball?

4. [10 points] Suppose that you play the following game. In this game you roll two 4-sided dice. For every 2, 3, or 4 that you roll you win \$10. For every 1 that you roll you lose \$20. Let X be the amount of money won or lost playing this game.

For example, if you roll $(2, 4)$ then you win $\$10 + \$10 = \$20$. If you roll $(2, 1)$ then you lose $\$10 - \$20 = -\$10$. If you roll $(1, 1)$ then you lose $-\$20 - \$20 = -\$40$.

(a) Calculate $P(X = -40)$

(b) Calculate $P(X = -10)$

(c) Calculate $P(X = 20)$

(d) Calculate $E[X]$.

5. [10 points] Suppose you play the following game. You roll two 4-sided dice over and over. Let A be the event that both dice are even. Let B be the event that one die is even and one die is odd. You keep rolling the dice until either event A or event B occurs. If event A occurs first then you lose \$5. If event B occurs first then you win \$10. Let X be the amount of money won or lost.

For example, if the rolls are $(1,1),(1,3),(2,2)$ then event A occurred first and you lost \$5. If the rolls are $(3,1),(3,3),(1,2)$ then event B occurred first and you win \$10.

(a) What is the probability that event A occurs before event B?

(b) What is the probability that event B occurs before event A?

(c) Calculate $E[X]$

Extra page if you need it for any of the problems....