Name: _____
MATH 108
Fall 2023
HW 9: Due 10/24

"I like to play blackjack. I'm not addicted to gambling. I'm addicted to sitting in a semicircle."
–Mitch Hedberg

Problem 1. (10pt) Suppose you play a game where you roll a loaded die. The probabilities for this die are (partially) given below. If you roll an even number, you win \$1. If you roll a one, you lose \$5. If you roll a three, you lose \$2. Finally, if you roll a five, you win/lose nothing.

n	1	2	3	4	5	6
$P(n)$		$\frac{2}{12}$	$\frac{3}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{4}{12}$

(a) Find $P(1)$.

(b) Find the probability that if you roll the die three times, you win \$1 each time.

(c) Find the average amount you win per game.

(d) Should you play this game? Explain.

Problem 2. (10pt) Suppose you are designing a game to 'reallocate' money from your friends to an account that you control. . . You will have them roll a four-sided dice—each side equally likely to occur. If they roll a four, neither of you wins money. If they roll a two or three, you will pay them \$2 or \$3, respectively. If they roll a one, they will flip a fair coin. If the coin is heads, they win/lose nothing. However, if the coins is tails, they will pay you some amount of money.

(a) Find the amount your friend must pay you if they roll a one and then flip a tails so that you will not lose money at this game 'in the long run.'

(b) If your friend plays this game one-hundred times, are you guaranteed to make money? Explain.