

Introduction to Contemporary Mathematics

Assignment 10

1. A jar contains 6 red marbles, 8 blue marbles and 1 green marble. A single marble is drawn. If you draw a red marble, you are paid \$1. If you draw a blue marble, you are paid \$2. If you draw a green you are paid \$10. What are your expected winnings in this game?
2. Suppose that in the above game, you had to pay \$2 to play. What would your expected winnings be (this is really easy)?
3. A jar contains 10 red marbles, 2 blue marbles and 1 green marble. A single marble is drawn. If you draw a red marble, you are paid \$1. If you draw a blue marble, you are paid \$2. If you draw a green you are paid \$10. What are your expected winnings in this game?
4. Suppose that in the above game, you had to pay \$2 to play. What would your expected winnings be?
5. A jar contains 14 red marbles and 1 green marble. A single marble is drawn. If you draw a red marble, you must pay \$1. If you draw a green you are paid \$100. What are your expected winnings in this game?
6. You flip a fair coin 2 times. How many heads do you expect?

To do this, you will build the following table

	outcome	probability	value
	HH	1/4	2
	HT	1/4	1
	TH	1/4	1
	TT	1/4	0

Then you find the expected value

$$E.V. = \frac{1}{4}(2) + \frac{1}{4}(1) + \frac{1}{4}(1) + \frac{1}{4}(0) = 1.$$

So the expected value is 1.

- (a) Flip a fair coin 3 times. How many heads do you expect?
 - (b) Flip a fair coin 4 times. How many heads do you expect?
You should be seeing a trend!
 - (c) Flip a fair coin 8 times. How many heads do you expect?
 - (d) Flip a fair coin 20 times. How many heads do you expect?
7. Tim's die has the following faces: 1, 1, 3, 3, 5, 5. Kristen's die has the following faces: 2, 2, 2, 4, 4, 4. They each roll their respective dice. What is the probability that Kristen wins?
 8. Paul has a regular die. Of these three, who has the die that wins most often?