STT 810

Homework 1

Due Friday, September 16th at 11:59:59pm

1. This is a simpler version of a more rigorous experiment we will do later in the semester.
    a. Use the sample function to define a variable with 100 simulations of rolling a single 6-sided die.
    b. Find the average value of this simulation. You can use the mean() function to find the mean.
    c. Next, duplicate (1) and (2) with
        i. 1,000 simulations.
        ii. 10,000 simulations
        iii. 100,000 simulations
        iv. 1,000,000 simulations

        Is the mean approaching the true value?
    d. Next, repeat the experiment with flipping a fair coin, with a 1 being heads and 0 being tails. Same convergence?
    e. Finally, repeat the experiment with an unfair coin which comes up heads 2/3 of the time.
2. 2 6-sided dice are rolled (each with values 1, 2, 3, 4, 5, 6). The outcome of the roll is found by the difference between the larger and smaller numbers (so that if a 3 and 5 are rolled, the result is a 2, if a 5 and a 1 is rolled, the results is a 4, if the results is a 3 and a 3, the results is a 0, etc.)
    a. Find the sample space.
    b. Find the probability that the result is a 1.
    c. Create a simulation of 10,000 rolls of the 2 dice. Calculate the difference and find the proportion of rolls for which the result is a 1. Does your result approximately agree with what you got in (b)?

3. In a certain game, 1 6-sided die is rolled and 2 coins are flipped. A person will win if the die rolls exactly the same value as the number of heads flipped.
    a. What is the probability of winning the game?
    b. Create a simulation of 10,000 plays of the game. Does the number of wins approximately agree with (a)?

4. A survey of a group's viewing habits over the last year revealed the following information:
    a. 28% watched gymnastics
    b. 29% watched baseball
    c. 19% watched soccer
    d. 14% watched gymnastics and baseball
    e. 12% watched baseball and soccer
    f. 10% watched gymnastics and soccer

g. 8% watched all three sports.

Calculate the percentage of the group that watched none of the three sports during the last year.

5. Matloff 1.9

6. Matloff 1.10

7. Matloff 2.1

8. Matloff 2.6