Essay on math 136 probability project

Law

Part 1: Theoretical Probability

A. Use a tree diagram to list all possible outcomes of the experiment of rolling two

dice.

B. Use your tree diagram to finish filling in this chart.

C. Are the sums (2 through 12) listed equally likely? Explain your answer.

We may observe that the probabilities for the sums 2-12 are not equally likely, as each sum has different number of favorable outcomes. Sum 2 and 12 have the least probability (1/36), as there is only one way you can get 2 (1, 1) and 12 (6, 6). On the contrary, the result 7 is the most likely with probability of 6/36, because 7 might be rolled 6 different ways - (1, 6) (2, 5) (3, 4) (4, 3) (5, 2) (6, 1).

Part 2: Empirical Probability

http://www. numeracysoftware. com/two%20dice%20sum. xls

- Use the website here (also on the course webpage) to simulate the experiment of rolling 2 dice 25, 100, 500 and 1000 times. Please note that the rolls are indicated in grey tabs at the bottom of the page. Copy the frequencies for each sum..

- Find the empirical proability by using the formula on p. 725; Write probability as a decimal value rounded to three decimal places.

Part 3: Law of Large Numbers

As the number of observation increases, the average value of these observations is likely to be closer to the expected value. The larger the number of observation, the smaller the deviation from the expected value.

- Choose a sum from the table in E.

- Sketch a horizontal line in the grid below for the theoretical probability

- Plot a dot at the probability in your chart for 25 rolls.

- Plot a dot at the probability in your chart for 100 rolls.

- Plot a dot at the probability in your chart for 500 rolls.

- Plot a dot at the probability in your chart for 1000 rolls.

- Choose a second sum from the table in E and repeat the steps above.

Explain how your graphs illustrate the Laws of Large Numbers.

We may observe that as the number of trials increases, the observed number of favorable outcomes gets closer to the expected value. We may clearly observe this trend on the graphs. The expected value for the sum of 12 is 1/36, or 0, 028. When we repeated the experiment 25 times, the observed value equaled 0, 08 (0, 052 greater than the expected value). When we repeated the experiment 100 times, the observed value equaled 0, 02 (only 0, 008 less than the expected value). Finally, when we repeated the experiment for 1000 times the observed value equaled 0, 029 (only 0, 001 greater than the expected value). After this experiment we may see how Law of Large Numbers works in practice.