Assignment 2

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1 Problem

Two dice, one blue and one grey, are thrown at the same time. Write down all the possible outcomes. What is the probability that the sum of the two numbers appearing on the top of the dice is
(i) 8?
(ii) 13?
(iii) less than or equal to 12?

2 Solution

2.1

Let event E represent the event of getting a sum of 8 on outcomes of dice. Number of outcomes on blue dice = 6
Number of outcomes on grey dice = 6
Total number of outcomes = $6 \times 6 = 36$
Let X denote outcome on blue die, Y denote outcome on grey die

$$Pr(X = i, Y = j) = \begin{cases} \dfrac{1}{36} & 1 \leq i, j \leq 6 \, , i, j \in \mathbb{N} \\ 0 & \text{otherwise} \end{cases}$$

(2.1.1)

Favourable events are listed below

$$\{X, Y\} = \{\{2, 6\}, \{3, 5\}, \{4, 4\}, \{5, 3\}, \{6, 2\}\} \quad (2.1.2)$$

number of favourable outcomes = 5
Since all outcomes are equally likely, we can write

$$Pr(E) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}} \quad (2.1.3)$$

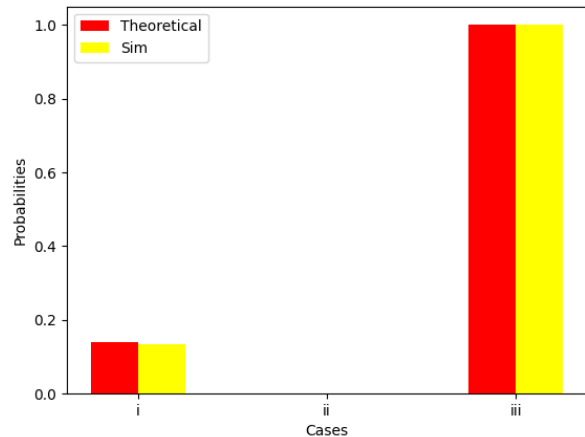$$Pr(E) = \frac{5}{36} = 0.138889 \quad (2.1.4)$$

2.2

The maximum sum of outcomes on both dice is 6+6=12, Therefore getting a sum of 13 is impossible. Probability=0.

2.3

Let event E represent the event of getting sum of outcomes of dice to be less than or equal to 12. Therefore, E' represents the event of getting sum of outcomes on dice to be greater than 12. Using result from previous part, E' is an impossible event. E is an event which will always happen.

$$Pr(E) = 1 \quad (2.3.1)$$

The graph in given below