Probability Assignment 1(12.13.4.11)

Saketh Ram Kumar Dondapati(AI22BTECH11023)

Question

Two dice are thrown simultaneously, if X denotes number of sixes, find the expectation of X

Solution

Let X be the random variable which represents the number of sixes when two dice are thrown together.
$X = \{0, 1, 2\}$, there can be 0,1 or 2 sixes
Assuming the dice are fair,

$$\Pr(X = 0) = \frac{25}{36} \tag{1}$$

$$\Pr(X = 2) = \frac{1}{36} \tag{2}$$

$$\Pr(X = 1) = 1 - \Pr(X = 0) - \Pr(X = 2) \tag{3}$$

$$= 1 - \frac{25}{36} - \frac{1}{36} \tag{4}$$

$$= \frac{5}{18} \tag{5}$$

The expectation can be calculated as:

$$E(X) = \sum_{i=0}^{2} i \Pr(X = i) \tag{6}$$

$$E(X) = 0.\frac{25}{36} + 1.\frac{5}{18} + 2.\frac{1}{36} \tag{7}$$

$$E(X) = \frac{1}{3} = 0.33 \tag{8}$$

*The author is with the Department of Artificial Intelligence, Indian Institute of Technology, Hyderabad 502285 India e-mail: ai22btech11023@iith.ac.in.