AI 1110 Assignment 1

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12.13.2.12 Question: A die is tossed thrice. Find the probability of getting an odd number at least once.

Answer: $\frac{7}{8}$

Solution:

Let A be the event of getting an odd number atleast once and $\Pr(A)$ be its probability.

Let X be a Binomial random variable, which is the number of times odd number occurs in the three throws of dice.

Let i be the number of times odd number occurs.

$\therefore \Pr(X = i) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \binom{3}{i}$

$$\implies \Pr(X = 1) = \frac{\binom{3}{1}}{8} = \frac{3}{8} \tag{1}$$

$$\implies \Pr(X = 2) = \frac{\binom{3}{2}}{8} = \frac{3}{8} \tag{2}$$

$$\implies \Pr(X = 3) = \frac{\binom{3}{3}}{8} = \frac{1}{8} \tag{3}$$

$\therefore$,

$$\Pr(A) = \Pr(X = 1) + \Pr(X = 2) + \Pr(X = 3) \tag{4}$$

$$= \frac{3}{8} + \frac{3}{8} + \frac{1}{8} \tag{5}$$

$$= \frac{7}{8} \tag{6}$$