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 required event.

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.

Let p be the probability of getting odd number on one throw of dice.

$\therefore \Pr(X = i) = \binom{3}{i} \cdot p^i \cdot (1 - p)^{3-i}$

$$\implies p = \frac{1}{2} \tag{1}$$

$$\implies \Pr(X = 1) = \binom{3}{1} \cdot p^1 \cdot (1 - p)^{3-1} = \frac{\binom{3}{1}}{8} = \frac{3}{8} \tag{2}$$

$$\implies \Pr(X = 2) = \binom{3}{2} \cdot p^2 \cdot (1 - p)^{3-2} = \frac{\binom{3}{2}}{8} = \frac{3}{8} \tag{3}$$

$$\implies \Pr(X = 3) = \binom{3}{3} \cdot p^3 \cdot (1 - p)^{3-3} = \frac{\binom{3}{3}}{8} = \frac{1}{8} \tag{4}$$

$\therefore,$

$$\Pr(A) = \Pr(X = 1) + \Pr(X = 2) + \Pr(X = 3) \tag{5}$$

$$= \frac{3}{8} + \frac{3}{8} + \frac{1}{8} \tag{6}$$

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