

Assignment 1

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- 1) A die is tossed thrice. Find the probability of getting an odd number at least once.

Solution:

Let X_i be the random variables representing the outcome of a die in first, second, third toss for $i \in \{1, 2, 3\}$ respectively. The probability mass function is given by

$$p_X(n) = \begin{cases} \frac{1}{6} & 1 \leq n \leq 6 \\ 0 & \text{otherwise} \end{cases} \quad (0.0.1)$$

The required probability is the complement to the event where every toss outcome is even. Let $E = \{2, 4, 6\}$, then the required probability is given by,

$$= 1 - \Pr(X_1 \in E, X_2 \in E, X_3 \in E) \quad (0.0.2)$$

$$= 1 - \Pr(X_1 \in E) \Pr(X_2 \in E \mid X_1 \in E) \Pr(X_3 \in E \mid X_1 \in E, X_2 \in E) \quad (0.0.3)$$

$$= 1 - \left(\frac{3}{6} \times \frac{3}{6} \times \frac{3}{6} \right) \quad (0.0.4)$$

$$= \frac{7}{8} \quad (0.0.5)$$