Assignment 1
AI1110: Probability and Random Variables
Indian Institute of Technology Hyderabad

CS22BTECH11046

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10.15.1.25: Question. Which of the following arguments are correct and which are not correct?Give reasons for your answer. (i) If two coins are tossed simultaneously there are three possible outcome s —two heads, two tails or one of each.Therefore, for each of these outcomes, the probability is $\frac{1}{3}$.

(ii) If a die is thrown, there are two possible outcomes— an odd number or an even number. Therefore, the probability of getting an odd number is $\frac{1}{2}$.

Solution:

(i) When two coins are tossed simultaneously, the possible outcomes are (H, H), (H, T), (T, H), (T, T), which are all equally likely. Therefore,

$$\Pr(\text{getting two heads}) = \frac{1}{4}$$

$$\Pr(\text{getting two tails}) = \frac{1}{4}$$

$$\Pr(\text{getting one of each}) = \frac{2}{4} = \frac{1}{2}$$

Explanation: Event with one of each head and tail contains two mutually exclusive events (H, T), (T, H) .Therefore, probality of getting one of each is $\frac{1}{2}$ and not $\frac{1}{3}$.

So, the above statement is incorrect.

(ii) Here, let E be the event 'getting an odd number'. The number of possible outcomes when a die is thrown is six : 1, 2, 3, 4, 5 and 6, and the outcomes favourable to E are 1, 3 and 6. Therefore, the number of outcomes favourable to E is 3. So,

$\Pr(E) = \frac{\text{Number of outcomes favourable to } E}{\text{Number of all possible outcomes}}$

$$\Pr(\text{E}) = \frac{3}{6} = \frac{1}{2}$$

Therefore, the probability of getting an odd number is $\frac{1}{2}$.

Explanation: Event of getting an odd number and Event of getting an even number are equally likely and they together forms an exhaustive event. Hence,

$$\Pr(\text{getting an odd number}) = \frac{1}{2}$$

$$\Pr(\text{getting an even number}) = \frac{1}{2}$$

So the above statement is correct.