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

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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,

sample space Ω ={$(H,H),(H,T),(T,H),(T,T)$}. E1={(H,H)}, E2={(T,T)} and E3 ={$(H,T),(T,H)$} Therefore,

$$\Pr(E1) = \frac{1}{4}$$
$$\Pr(E2) = \frac{1}{4}$$
$$\Pr(E3) = \frac{2}{4} = \frac{1}{2}$$

Reason: Event E3 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'.

sample space Ω ={$1,2,3,4,5,6$}.E={$1,3,5$}

Therefore,

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

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

$$\Pr(E) = \frac{1}{2}$$
$$\Pr\left(\bar{E}\right) = \frac{1}{2}$$

So the above statement is correct.