

Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Technology Hyderabad

Bonthu Mani Hemanth Reddy
CS22BTECH11013

10.15.1.3 Question: Why is tossing a coin considered to be a fair way of deciding which team should get the ball at the beginning of a football game?

Solution: Sample space of tossing a coin= $\{H, T\}$

Let us assign Head(H) to one team and Tail(T) to the other team.

Probability of an event E , $P(E)$ is defined as

$$P(E) = \frac{\text{Number of outcomes favourable to event } E}{\text{Total number of outcomes in sample space}}$$

$$\Rightarrow P(H) = \frac{\{H\}}{\{H, T\}} = \frac{1}{2} \quad (1)$$

$$\Rightarrow P(T) = \frac{\{T\}}{\{H, T\}} = \frac{1}{2} \quad (2)$$

From (1) and (2), We can see that both H and T have equal probability i.e, both teams have equal probability of winning the toss.Hence, this is a fair way to decide which team should get the ball at the beginning of a football game.