School of Engineering and Applied Science (SEAS), Ahmedabad University

Probability and Stochastic Processes (MAT277)

Homework Assignment-1

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1. **While tossing a biased die, calculate the probability that face 3 has turned up, Given Alex tells either face 3 or face 6 has turned up.**

   (a) *We are given that,*

Face	1	2	3	4	5	6
Probability	0.2	0.22	0.11	0.25	0.15	0.07

Let A be the event that face 3 has turned up and B be the event that face 6 has turned up.

$$\therefore P(A) = 0.11 \quad \& \quad P(B) = 0.07$$

We know that these two are mutually exclusive events, hence:

$$\begin{aligned}\therefore P(A \cup B) &= P(A) + P(B) \\ &= 0.11 + 0.32 \\ &= 0.43\end{aligned}$$

Clearly, here we have to find the conditional probability, $P(A \mid A \cup B)$

$$P(A \mid A \cup B) = \frac{P(A \cap (A \cup B))}{P(A \cup B)}$$

$$= \frac{P(A)}{P(A \cup B)}$$

$$= \frac{0.11}{0.43}$$

$$= 0.2558139535.$$

$$\boxed{\therefore \; P(A \mid A \cup B) \;\approx\; 0.2559}$$

Hence, the probability that face 3 has turned up, given either face 3 or face 6 has turned up is approx 25.59%