# Assignment 2

**AI1110**: Probability and Random Variables
Indian Institute of Techonology Hyderabad

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**12.13.6.18: Question**. Consider the experiment of throwing a die, if a multiple of 3 comes up, throw the die again and if any other number comes, toss a coin. Find the conditional probability of the event 'the coin shows a tail', given that 'at least one die shows a 3'.

**Answer: 0**

**Solution:** The sample space for the given experiment is:

$$S = \Big\{(3,1),(3,2)....,(3,6)(6,1)....,(6,6),(1,T),(2,T),(4,T),(5,T)(1,H),(2,H),(4,H),(5,H)\} \tag{1}$$

Now,

1) Let A be an event such that 'The coin shows a tail' .

$$A = \Big\{(1,T),(2,T),(4,T),(5,T)\} \tag{2}$$

2) Let B be an event such that 'At least one die shows a 3' .

$$B = \Big\{(3,1),(3,2),(3,3),(3,4),(3,5),(3,6),(6,3)\} \tag{3}$$

To Find,

$$\Pr(A \mid B) \tag{4}$$

And we know that,

$$\Pr(A \mid B) = \frac{\Pr(AB)}{\Pr(B)} \tag{5}$$

From (2) and (3),

$$\implies AB = \phi \tag{6}$$

$$\implies \Pr(AB) = 0 \tag{7}$$

Putting the value from (7) in (5),

$$\Pr(A \mid B) = \frac{(0)}{\Pr(B)} \tag{8}$$

$$\implies \Pr(A \mid B) = 0 \tag{9}$$

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