

# Assignment-1

Lanka Prasanna - CS20BTECH11029

Download all latex codes from:

<https://github.com/PrasannaLanka/Assignment1/blob/main/Assignment1/main.tex>

Similarly,

$$\begin{aligned}\Pr(X = 1, Y > 4) &= \Pr(X = 1, Y = 5) + \Pr(X = 1, Y = 6) \\ &= \frac{1}{12} + \frac{1}{12} \\ &= \frac{1}{6}\end{aligned}$$

## Problem:

Consider the experiment of tossing a coin. If the coin shows head, toss it again but if it shows tail, then throw a die. Find the conditional probability of the event that “the die shows a number greater than 4” given that “there is at least one tail”.

## Solution:

Given that a coin is tossed.

If coin shows head, it is tossed again.

If it shows tail, then a die is thrown.

Let  $X \in \{0, 1\}$  be the random variable such that 1 represents occurrence of tail, 0 represents occurrence of head when coin is tossed.

We need  $\Pr(Y > 4 | X = 1)$

We know that,

$$\begin{aligned}\Pr(Y > 4 | X = 1) &= \frac{\Pr(Y > 4, X = 1)}{\Pr(X = 1)} \\ &= \frac{2}{9}\end{aligned}$$

∴ The required probability is  $\boxed{\frac{2}{9}}$

TABLE I: Probability distribution for values of X

X	P(X)
1	$\frac{1}{2}$
0	$\frac{1}{2}$

Let Y denotes the getting a number on the die thrown, then the probability distribution is

TABLE II: Probability distribution for values of Y

Y	1	2	3	4	5	6
P(Y)	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

$$\begin{aligned}\Pr(X = 1) &= \sum_{i=1}^6 \Pr(X = 1, Y = i) + \Pr(X = 0, X = 1) \\ &= \frac{1}{4} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} \\ &= \frac{1}{4} + \frac{6}{12} \\ &= \frac{3}{4}\end{aligned}$$