

# Assignment 2

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Download all python codes from

<https://github.com/Dhatri-nanda/Miin/blob/main/Assignment2/code.py>

and latex-tikz codes from

<https://github.com/Dhatri-nanda/Miin/blob/main/Assignment2/Assignment2.tex>

By substituting the probabilities in (2.0.1)

$$\Rightarrow 0.1 + k + 2k + 2k + k = 1 \quad (2.0.2)$$

$$\Rightarrow 6k = 0.9 \quad (2.0.3)$$

Therefore, from (2.0.3)

$$k = 0.15 \quad (2.0.4)$$

So from 2

x	0	1	2	3	4
$\Pr(X = x)$	0.1	0.15	0.3	0.3	0.15

TABLE 2: Probabilities after finding k

## 1 PROBLEM

Let X denote the number of hours you study during a randomly selected school day. The probability that X can take the values x, has the following form, where k is some unknown constant.

$$\Pr(X = x) = \begin{cases} 0.1 & x = 0 \\ kx, & 1 \leq x \leq 2 \\ k(5 - x), & 3 \leq x \leq 4 \\ 0, & \text{otherwise} \end{cases} \quad (1.0.1)$$

- A) Find the value of k.  
B) What is the probability that you study at least two hours? Exactly two hours? At most two hours?

## 2 SOLUTION

If we expand the probabilities given further more by substituting the value of x and only considering 0 to 4 hours as the probability of studying in the remaining hours is zero, we get

x	0	1	2	3	4
$\Pr(X = x)$	0.1	k	2k	2k	k

TABLE 2: Given probabilities

we also know that,

$$\sum_{k=0}^4 \Pr(X = k) = 1 \quad (2.0.1)$$

- 1) Probability of studying at least two hours

$$\Rightarrow \sum_{k=2}^4 \Pr(X = k) \quad (2.0.5)$$

$$\Rightarrow \Pr(X = 2) + \Pr(X = 3) + \Pr(X = 4) \quad (2.0.6)$$

By substituting probabilities in (2.0.6)

$$= 0.3 + 0.3 + 0.15 \quad (2.0.7)$$

$$= 0.75 \quad (2.0.8)$$

- 2) Probability of studying exactly two hours

$$= \Pr(X = 2) \quad (2.0.9)$$

$$= 0.3 \quad (2.0.10)$$

- 3) Probability of studying at most two hours

$$\Rightarrow \sum_{k=0}^2 \Pr(X = k) \quad (2.0.11)$$

$$\Rightarrow \Pr(X = 0) + \Pr(X = 1) + \Pr(X = 2) \quad (2.0.12)$$

By substituting probabilities in (2.0.12)

$$= 0.1 + 0.15 + 0.3 \quad (2.0.13)$$

$$= 0.55 \quad (2.0.14)$$

$\Pr(X \geq 2)$	$\Pr(X = 2)$	$\Pr(X \leq 2)$
0.75	0.3	0.55
Case 1	Case 2	Case 3

TABLE 3: Final solution

