

# Assignment 8

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# Outline

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## Question

### Example 15 [NCERT 12] :

A person has undertaken a construction job. The probabilities are 0.65 that there will be strike, 0.80 that the construction job will be completed on time if there is no strike, and 0.32 that the construction will be completed on time if there is a strike. Determine the probability that the construction job will be completed on time.

# Denote Random Variables

## Assign events to random variables

Denote the random variables  $X, Y \in \{0, 1\}$ . Events for each random variable are displayed in Table 1:

Variable	Event
$X = 0$	No strike
$X = 1$	Strike is there
$Y = 0$	Construction will not be completed on time
$Y = 1$	Construction will be completed on time

Table 1

# Given data

## Represent the given data

The probability we are required to find is  $\Pr(Y = 1)$ . Various values of probability are displayed in Table 2:

Variable	Event
$\Pr(X = 1)$	0.65
$\Pr(X = 0)$	0.35
$\Pr(Y = 1 X = 0)$	0.80
$\Pr(Y = 1 X = 1)$	0.32

Table 2

# Solution

From Total probability theorem

$$\Pr(Y = 1) = \sum_{j=0}^1 \Pr(X = j) \times \Pr(Y = 1|X = j) \quad (1)$$

$$\Rightarrow \boxed{\Pr(Y = 1) = 0.488} \quad (2)$$