# 10.3.3.3.5

## EE24BTECH11036 - Krishna Patil

**Question**: In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that the student has opted neither NCC nor NSS.

**Solution:** Define random variables $X$ and $Y$ as shown in the table 0,

| Random Variable | Event |
|:---:|:---:|
| $X = 0$ | Student does not opt for NCC |
| $X = 1$ | Student opts for NCC |
| $Y = 0$ | Student does not opt for NSS |
| $Y = 1$ | Student opts for NSS |

TABLE 0: defining random variable

From the given data

$$\Pr(X = 1) = \frac{30}{60} = \frac{1}{2} \tag{1}$$

$$\Pr(Y = 1) = \frac{32}{60} = \frac{8}{15} \tag{2}$$

$$\Pr(X = 1, \ Y = 1) = \frac{24}{60} = \frac{2}{5} \tag{3}$$

Now using axioms of probability (boolean logic), Thus, we write

$$\Pr(X = 1, \ Y = 0) = \Pr(X = 1) - \Pr(X = 1, \ Y = 1) = \frac{1}{10} \tag{4}$$

$$\Pr(X = 0, \ Y = 1) = \Pr(Y = 1) - \Pr(X = 1, \ Y = 1) = \frac{2}{15} \tag{5}$$

$$\Pr(X = 0, \ Y = 0) = \Pr(Y = 0) - \Pr(X = 1, \ Y = 0) \tag{6}$$

$$= 1 - \Pr(Y = 1) - \Pr(X = 1, \ Y = 0) \tag{7}$$

$$= 1 - \frac{8}{15} - \frac{1}{10} = \frac{11}{30} \tag{8}$$

So, the probablity $\Pr(X = 0, \ Y = 0)$ i.e., the probability that the student has opted neither NCC nor NSS is $\frac{11}{30} = 0.36667$. Also after verifying using computational method to get the probability as 0.36680.