

# Assignment 1

AI1110: Probability and Random Variables  
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**10.13.3.40: Question.** A lot consists of 48 mobile phones of which 42 are good, 3 have only minor defects and 3 have major defects. Varnika will buy a phone if it is good but the trader will only buy a mobile if it has no major defect. One phone is selected at random from the lot. What is the probability that it is

- 1) acceptable to Varnika?
- 2) acceptable to the trader?

**Answer:**

- 1)  $\frac{7}{8}$
- 2)  $\frac{15}{16}$

**Solution:**

Let  $X$  be the random variable representing the selected mobile phone, then  $X$  can be the values 0, 1, 2 where,

|         |                              |
|---------|------------------------------|
| $(X=0)$ | A phone with major defects   |
| $(X=1)$ | A phone with minor defects   |
| $(X=2)$ | A good phone with no defects |

TABLE 2: Given Information

We can define the probability mass function (pmf) of  $X$  as follows:

$$\Pr(X = 0) = \frac{3}{48} \quad (1)$$

$$\Pr(X = 1) = \frac{3}{48} \quad (2)$$

$$\Pr(X = 2) = \frac{42}{48} \quad (3)$$

- 1) Probability that the selected mobile phone is acceptable to Varnika is  $\Pr(X = 2)$ :

$$\Pr(X = 2) = \frac{42}{48} \quad (4)$$

$$= \frac{7}{8} \quad (5)$$

- 2) Probability that the selected mobile phone is acceptable to the trader is  $1 - \Pr(X = 0)$ :

$$1 - \Pr(X = 0) = 1 - \frac{3}{48} \quad (6)$$

$$= \frac{45}{48} \quad (7)$$

$$= \frac{15}{16} \quad (8)$$