# Assignment 3 : Example 9

Abhay Shankar K : cs21btech11001

**Question:**

Consider the frequency distribution table (given below), which gives the weights of $38$ students in a class.

(**i**) Find the probability that the weight of a student in a class lies in the interval $46-50$.

(**ii**) Give two events in this context, one having probability $0$, and the other having probability $1$.

TABLE I
DISTRIBUTION OF WEIGHTS OF STUDENTS IN A CLASS

| Weight class | Number of students (frequency) |
|---|---|
| 31 - 35 | 9 |
| 36 - 40 | 5 |
| 41 - 45 | 14 |
| 46 - 50 | 3 |
| 51 - 55 | 1 |
| 56 - 60 | 2 |
| 61 - 65 | 2 |
| 66 - 70 | 1 |
| 71 - 75 | 1 |

**Solution:**

(**i**) Let us define a random variable X, which represents the weight class of a student. The range of X and the corresponding weight class is given in the table below.

TABLE II
RANGE OF X MAPPED TO WEIGHT CLASSES FROM I

| Weight class | X |
|---|---|
| 31 - 35 | 1 |
| 36 - 40 | 2 |
| 41 - 45 | 3 |
| 46 - 50 | 4 |
| 51 - 55 | 5 |
| 56 - 60 | 6 |
| 61 - 65 | 7 |
| 66 - 70 | 8 |
| 71 - 75 | 9 |

Therefore,

$$P_X(1) = \frac{9}{38} = 0.237 \tag{1}$$
$$P_X(2) = \frac{5}{38} = 0.131 \tag{2}$$
$$P_X(3) = \frac{14}{38} = 0.368 \tag{3}$$
$$P_X(4) = \frac{3}{38} = 0.079 \tag{4}$$
$$P_X(5) = \frac{1}{38} = 0.026 \tag{5}$$
$$P_X(6) = \frac{2}{38} = 0.053 \tag{6}$$
$$P_X(7) = \frac{2}{38} = 0.053 \tag{7}$$
$$P_X(8) = \frac{1}{38} = 0.026 \tag{8}$$
$$P_X(9) = \frac{1}{38} = 0.026 \tag{9}$$

From (4), the probability that the weight of a student is in the weight class $(46-50)$ is $\underline{0.079}$.

(**ii**)
- The probability that the weight of a student is greater that 75 is $0$.
- The probability that the weight of a student is in the interval $[31, 75]$ is $1$.

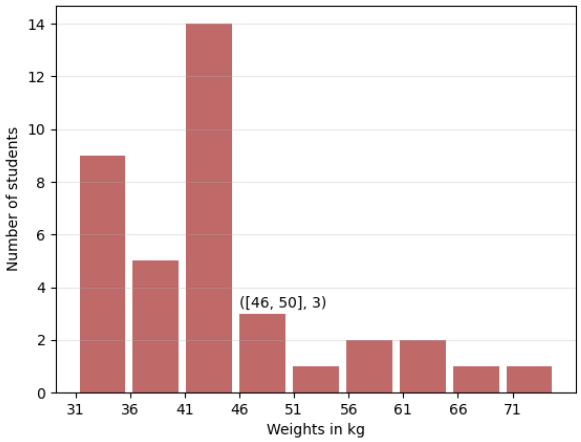


Fig. 1. Histogram of given data (produced using python)