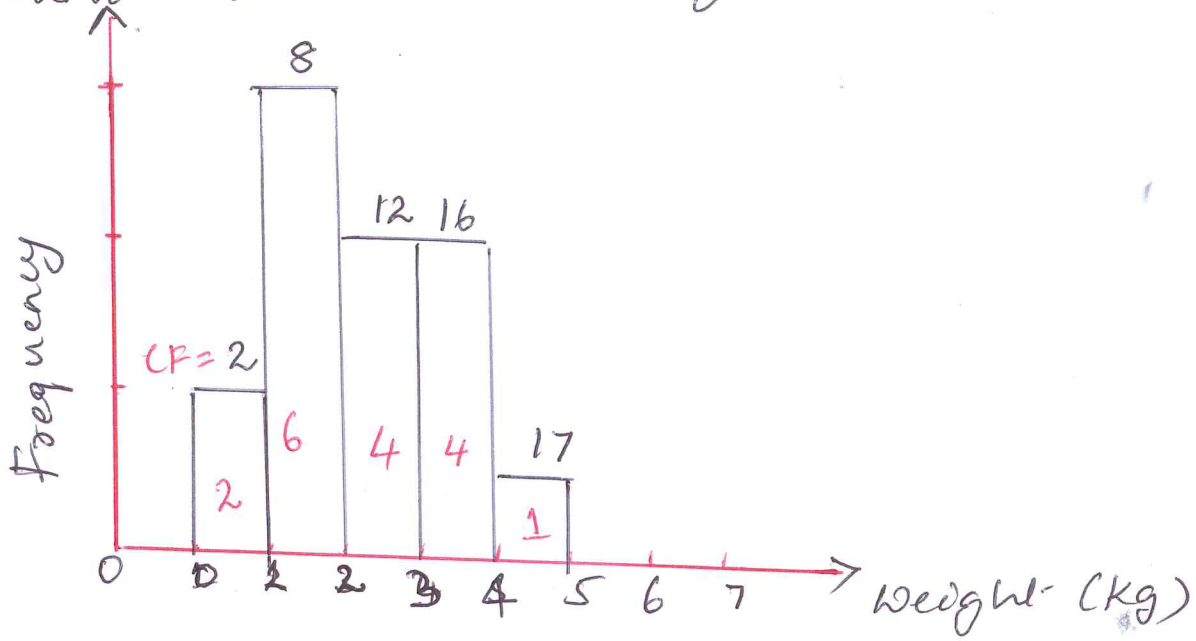
Estimating the Mode, Mean, Median and Quartiles using Histogram



Total frequency / no. of values = 17

CF = cumulative frequency.

Mode: It is unimodal.

Lies in the interval 1–2

mode ≈ 1.5 (midpoint of the interval)

Median.

Median location = $0.5(n+1) = 9$

Median lies in the interval 2–3

$$\text{Median} = \text{start-point of the interval where the median lies} + \left[\frac{\text{Position of the median in the interval}}{\text{No. of values in the interval}}\right] \times \text{class width of the interval}$$

Median is in 2-3

$$\text{Median} \approx 2 + \frac{9-8}{12-8}(1)$$

$$\approx 2 + \frac{1}{4} = \underline{2.25}$$

Similarly we can find other Quartiles.

Lower Quartile, Q_1 at $= 0.25(n+1)$

$$= \frac{18}{4} = 4.5$$

Quartile lies in interval 1-2

$$Q_1 \approx 1 + \left(\frac{4.5 - 2}{8 - 2}\right) 1$$

$$\approx 1 + \left(\frac{2.5}{6}\right) \approx \underline{1.42}$$

Upper Quartile, Q_3 at $= 0.75(n+1)$

$$= \frac{18 \times 3}{4} = 13.5$$

Q_3 lies in interval 3-4

$$Q_3 \approx 3 + \left(\frac{13.5 - 12}{16 - 12}\right) \times 1$$

$$\approx 3 + \frac{1.5}{4}$$

$$\approx \underline{3.38}$$

Inter quartile range, $IQR = Q_3 - Q_1$

$$IQR = 3.38 - 1.42$$
$$= 1.96$$

Mean

$$\text{Mean} \approx \frac{\text{Sum of the product of the midpoints and frequency of the bins}}{\text{Total frequency}}$$

For ex: mid point of class interval.

$$0 - 1 = \frac{0+1}{2} = 0.5$$

$$\text{Mean} \approx \frac{(0.5)2 + (1.5)6 + (2.5)4 + (3.5)4 + (4.5)1}{17}$$

$$\approx \frac{38.5}{17}$$

$$\text{Mean} \approx 2.26$$

Exercise:

Estimate Mean, Median and mode for the following data using Histogram (Note: plot the histogram)

Frequency distribution Table

class Interval	freq
0 - 10	8
10 - 15	22
15 - 30	45
30 - 50	18