ASSIGNMENT-1

Q1.) Suppose that the values for a given set of data are grouped into intervals. The intervals and corresponding frequencies are as follows:

Age Group	Frequency	Cumulative Frequency (CF)
1-5	200	200
6-15	450	650
16-20	300	950
21-50	1500	2450
51-8	700	3150
81-110	44	3194

Compute an approximate median value for the data.

$$\text{Median} = l_1 + \left(\frac{\frac{n}{2} - (\sum f) \times l}{\text{freq median}} \right) \times \text{width}$$

- Total Frequency (NNN) = **3194**

- Median Position = N/2 = 3194/2 =1597

- The cumulative frequency just before **1597** is **950**, and the next class is **21–50**, so this is the **median class**.

- L1= 21 (Lower boundary of the median class **21–50**)

- $\sum$f previous= 950

- F_median=1500

- w= 50–21= 29

$$\text{Median} = 21 + \left(\frac{1597 - 950}{1500}\right) \times 29$$

$$= 21 + \left(\frac{647}{1500}\right) \times 29$$

$$= 21 + (0.4313 \times 29)$$

$$= 21 + 12.51$$

$$\approx 33.51$$

Q2.) Suppose that a hospital tested the age and body fat data for 18 randomly selected adults with the following results:

age	23	23	27	27	39	41	47	49	50
%fat	7.8	9.5	17.8	25.9	26.5	27.2	27.4	28.8	30.2

age	52	54	54	56	57	58	58	60	61
%fat	31.2	31.4	32.9	33.4	34.1	34.6	35.7	41.2	42.5

- Calculating Mean Age:

$$\bar{x} = \frac{\sum x_i}{n}$$

Here,

x_i = ith observation, $1 \leq i \leq n$

$\sum x_i$ = Sum of observations

n = Number of observations

$\sum x_i$ = 836

n = 18

$\bar{x}$ = 836/18 = 46.44

- Calculating Median for Age:

  If n is odd, the median is at position $\frac{n+1}{2}$.

  If n is even, the median is the average of the values at positions $\frac{n}{2}$ and $\frac{n}{2} + 1$.

  Number of ages = 18 (even), so:

$$\text{Median Age} = \frac{50 + 52}{2} = \boxed{51.0}$$

Age (x_i)	Mean ($\bar{x}$)	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
23	46.4	-23.4	547.56
23	46.4	-23.4	547.56
27	46.4	-19.4	376.36
27	46.4	-19.4	376.36
39	46.4	-7.4	54.76
41	46.4	-5.4	29.16
47	46.4	0.6	0.36
49	46.4	2.6	6.76
50	46.4	3.6	12.96
52	46.4	5.6	31.36
54	46.4	7.6	57.76
54	46.4	7.6	57.76

56	46.4	9.6	92.16
57	46.4	10.6	112.36
58	46.4	11.6	134.56
58	46.4	11.6	134.56
60	46.4	13.6	184.96
61	46.4	14.6	213.16

$$\text{Variance} = \frac{\Sigma(xi - x\bar{})}{n} = \frac{2970.12}{18} = \boxed{165.01}$$

$$\text{Standard Deviation} = \sqrt{\text{Variance}} = \sqrt{165.01} = \boxed{12.85}$$

- Calculating Mean Fat:

Σx_i = 518.1

n = 18

$\bar{x}$ = 518.1/18 = $\boxed{28.78}$

- Calculating Median for Fat:

$$\text{Median Fat Percentage} = \frac{31.2 + 30.2}{2} = \boxed{30.7}$$

x_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
31.2	4.63	21.44
34.6	8.03	64.48
42.5	15.93	253.76
28.8	2.23	4.97
33.4	6.83	46.65
30.2	3.63	13.18
34.1	7.53	56.70
32.9	6.33	40.07
41.2	14.63	214.04
35.7	9.13	83.36

$$\text{Variance} = \frac{1544.12}{18} = \boxed{85.6}$$

$$\text{Standard Deviation} = \sqrt{85.6} = \boxed{9.25}$$