First lecture
<u>Statistics</u>

<u>Statistics</u> : It is a branch of mathematics dealing with the collecting, summarizing, presenting and analyzing data which measure numerically, this analysis may lead to conclusions and subsequent decisions.

<u>The types of statistics:</u>

1- **Descriptive Statistics**: It is used to describe a set of data for a sample in a population and calculate the mean, median, and standard deviation

2- **Inferential Statistics**: It is used to infer and inquire about the characteristics of the sample and the statistical distribution of its data.

<u>The Data</u>: The numbers or values which represent any phenomenon in life.

<u>The types of data:</u>

1- **Ungrouped Data :** The values or numbers which is getting it for any phenomenon forms resources, population and institutes.

2. **Grouped Data :** The data putting in table and the table contains two columns (classes, frequency).

Example: Arrange the following data for the residents of the first street in the city relative to their ages in a table according to classes and frequency.

10	20	22	30	39	26	23
40	14	44	15	35	43	31
12	13	23	25	29	28	50
38	52	27	16	18	19	24
55	21	42	33	54	17	26
28	59	32	25	34	16	56
51	32	58	22	45	53	37
29	38	48	26	52	33	47

Classes (L_i - u_i)	Frequency (f_i)	Center Classes ($x_i=(L_i + u_i) / 2$
10 – 19	10	14.5
20 – 29	17	24.5
30 – 39	12	34.5
40 – 49	7	44.5
50 – 59	10	55.5
	$\sum_{i=1}^{5} f_i = 56$	

Measures of Central Tendency:

1- **Mean (Average):** Let (x_1 , x_2 , …….. , x_n) be a set of data (results) represent a finite sample of size (n), the sample (**mean**) which denoted by ($\overline{x}$) is:

$$\overline{x} = \frac{\sum_{i=1}^{n} x_i}{n} \quad \text{for ungrouped data}$$

$$\overline{x} = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i} \quad \text{for grouped data}$$

Where : x_i is the center classes, f_i : is a frequency.

***Example 1*:** Find the **mean** for the following measurements :

$$7, 13, 16, 20, 23, 27, 29$$

Solution:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{7 + 13 + 16 + 20 + 23 + 27 + 29}{7} = \frac{135}{7}$$
$$= 19.285$$

***Example2*:** If you have the following data: 1, 4, 31, 32, 33, 34, 36, 40 , Find the **average**.

Solution:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{1 + 4 + 31 + 32 + 33 + 34 + 36 + 40}{8} = \frac{211}{7}$$
$$= 26.375$$

***Example 3*:** If you have the frequency distribution table which represents the temperatures of the weather at 20 days in Baghdad.

Classes: $(20 - 24) , (25 - 29) , (30 - 34) , (35 - 39) , (40 - 44)$

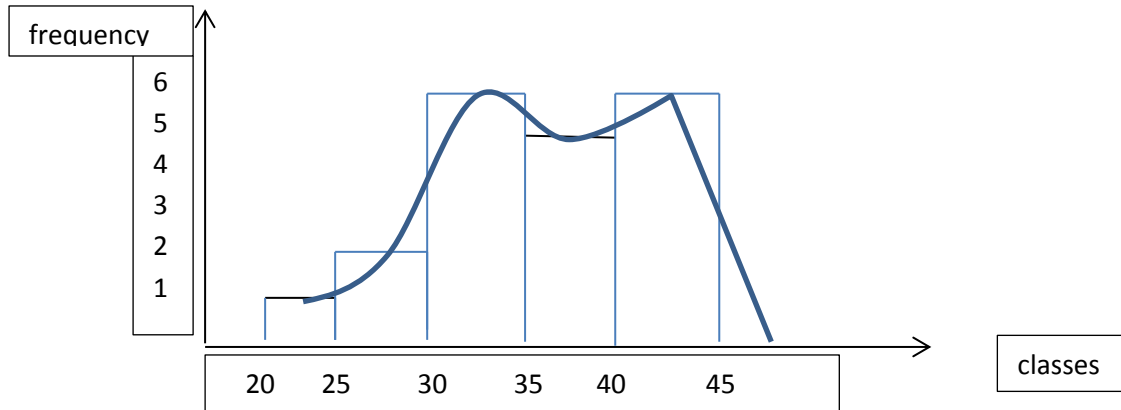Frequency: 1   ,   2   ,   6   ,   5   ,   6
Find the mean.

Solution:

Classes	Frequency (f_i)	(x_i)	($f_i x_i$)
20 - 24	1	22	22
25 – 29	2	27	54
30 – 34	6	32	192
35 – 39	5	37	185
40 - 44	6	42	252
	$\sum_{i=1}^{5} f_i = 20$		$\sum_{i=1}^{5} f_i x_i = 705$

$$\bar{x} = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i} = \frac{705}{20} = 35.25$$

The mean (average) of temperature in Baghdad at 20 days.

Graph of data: put the date frequency on y- axis and classes data on x-axis and draw with them as:

Quiz: find the mean of the degree of students of first stage in Biostatistics :

And draw the results. (Put the data in table.)

(30-39) , (40- 49) , (50-59) , (60- 69) , (70-79) , (80-89) , (90-100)

5 , 12 , 14 , 18 , 15 , 8 , 4