

M118 SECTION 11.2 – Measures of Central Tendency

1) Mean = average = $\frac{\text{sum of all measurements}}{\# \text{ of all measurements}}$; Most widely used measure of central tendency

In statistics we are concerned with two means -

$$\bar{x} = \text{sample mean} \quad \mu = \text{population mean}$$

For **ungrouped data**: Let $x_1, x_2, x_3, \dots, x_n$ be a set of n measurements

$$\text{mean} = \frac{\sum_{i=1}^n x_i}{n} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Ex: Find the mean of sample data 3.2, 4.5, 2.8, 5.0 and 3.6

$$\bar{x} = 3.82$$

GROUPED DATA: n measurements are grouped into k total number of intervals
 x_i is the midpoint of the i th interval
 f_i is the i th class frequency

$$\text{mean} = \frac{\sum_{i=1}^k x_i f_i}{n}$$

Matched Problem 2: Compute mean

Interval	Frequency	Midpoint
.5 - 5.5	6	3
5.5 - 10.5	20	8
10.5 - 15.5	18	13
15.5 - 20.5	4	18

$$\bar{x} = \frac{6 \cdot 3 + 20 \cdot 8 + 18 \cdot 13 + 4 \cdot 18}{48} \approx 10.08$$

CALCULATOR: $L_1 = \text{Midpoint}$
 $L_2 = \text{Frequency}$

2nd List \rightarrow Math Menu \rightarrow mean (L_1, L_2) ≈ 10.08

#6 : ON CALCULATOR
Find the mean:

Interval	Frequency	Midpoint
.5 - 2.5	5	
2.5 - 4.5	1	
4.5 - 6.5	2	
6. - 8.5	7	

MEDIAN:

UNGROUPED DATA:

1) If number of measurements is **odd**, the median is the middle measurement when arranged in order.

2) If number of measurements is **even**, the median is the mean of the two middle measurements when arranged in order.

EX: 47 51 60 69 80 81 85 91 91 95
even number - two middlemost numbers 80 and 81
mean of 80 and 81 = $(80 + 81) / 2 = 80.5 = \text{median}$

EX: 47 51 60 69 80 81 85 91 91 95 99
odd number - middle measurement = 81

GROUPED DATA: In a histogram – same area to the left as to the right.

Matched Problem 4: Find the median:

Class Interval	Frequency
3.5 – 4.5	4
4.5 – 5.5	2
5.5 – 6.5	3
6.5 – 7.5	5
7.5 – 8.5	4
8.5 – 9.5	3

16 Find the mean and median
Do mean with calculator:

Interval	Frequency
-0.5 – 4.5	5
4.5 – 9.5	54
9.5 – 14.5	25
14.5 – 19.5	9
19.5 – 24.5	4
24.5 – 29.5	1
29.5 – 34.5	2

Mean =

Median:

Area = (number of data items)(width of interval) = (100)(5) = 500
so $500/2 = 250$ square units on either side

$$5 \cdot 5 + (M - 4.5)54 = 250$$

$$54M - 243 = 225$$

$$54M = 468$$

$$M \approx 8.67$$

MODE: The most frequently occurring measurement
 0, 1 or several modes.
 not used as often as mean and median

Find the mean median and mode for the following data:

47 51 80 91 85 69 91 95 81 60

#20 Find the mean and median:

Class Interval	Frequency
149.5 - 169.5	4
169.5 - 189.5	11
189.5 - 209.5	15
209.5 - 229.5	25
229.5 - 249.5	13
249.5 - 269.5	7
269.5 - 289.5	3
289.5 - 309.5	2

Do mean on calculator: mean =

Median: Area = $80(20) = 1600$
 so $1600/2 = 800$

$$20(4) + 20(11) + 20(15) + (M - 209.5)25 = 800$$

$$600 + 25M - 5237.5 = 800$$

$$25M = 5437.5$$

$$M = 217.5$$