

Central Tendencies Assignment -

Q1. Find the mean of the following data using hand and compare it with `numpy.mean()`.

(a) 9, 7, 11, 13, 2, 4, 5, 5

$$\mu = \frac{9+7+11+13+2+4+5+5}{8}$$
$$= \frac{56}{8} = 7$$

from `numpy.mean()`, the value is also 7.


(b) 2.2, 10.2, 14.7, 5.9, 4.9, 11.1, 10.5

$$\mu = \frac{2.2+10.2+14.7+5.9+4.9+11.1+10.5}{7}$$
$$= \frac{59.5}{7} = 8.5$$

from `numpy.mean()`, the value is also 8.5.

(c) $1\frac{1}{4}$, $2\frac{1}{2}$, $5\frac{1}{2}$, $3\frac{1}{4}$, $2\frac{1}{2}$

$$\mu = \frac{\frac{5}{4} + \frac{5}{2} + \frac{11}{2} + \frac{13}{4} + \frac{5}{2}}{5}$$
$$= 3$$

from `numpy.mean()`, the value is 3. 

Q4. The mean of 8, 11, 6, 14, x and 13 is 66. Find the value of the observation x .

$$\mu = 66$$

$$\Rightarrow \frac{8+11+6+14+x+13}{6} = 66$$

$$\Rightarrow \frac{52+x}{6} = 66$$

$$\Rightarrow x = 344$$

Q5. The mean of 6, 8, $x+2$, 10, $2x-1$ and 2 is 9. Find the value of x and also the value of the observation in the data.

$$\mu = 9$$

$$\Rightarrow \frac{6+8+x+2+10+2x-1+2}{6} = 9$$

$$\Rightarrow \frac{27+3x}{6} = 9$$

$$\Rightarrow x = \frac{(9 \times 6) - 27}{3} = 9$$

$$\therefore (x+2) = 9+2 = 11$$

$$(2x-1) = 2(9)-1 = 17$$

6. Find the mean of the following distribution -

(a) The age of 20 boys in a locality is given below,

Age (years)	12	10	15	14	8
Number of boys	5	3	2	6	4

$$\text{Total number of boys} = 5 + 3 + 2 + 6 + 4 = 20$$

$$\text{Total age} = (12 \times 5) + (10 \times 3) + (15 \times 2) + (14 \times 6) + (8 \times 4)$$

$$= 60 + 30 + 30 + 84 + 32 = 236$$

$$\mu = \frac{236}{20} = 11.8$$

*(b) Marks obtained by 40 students in an exam are given below -

Marks	25	30	15	20	24
Num of Students	8	12	10	6	4

$$\mu = \frac{25(8) + 30(12) + 15(10) + 20(6) + 24(4)}{8 + 12 + 10 + 6 + 4}$$

$$= \frac{200 + 360 + 150 + 120 + 96}{40} = \frac{926}{40} = 23.15$$

7. Find the mode of the following data,

(a) 12, 8, 4, 8, 1, 8, 9, 11, 9, 10, 12, 8

The most frequent one is 8

(b) 15, 22, 17, 19, 22, 17, 29, 24, 17, 15

$$\text{Mode} = 17$$

(c) 0, 3, 2, 1, 3, 5, 4, 3, 4, 2, 1, 2, 0

$$x_{\text{mode}} = 3$$

(d) 1, 7, 2, 4, 5, 9, 8, 3

~~No~~ No value occurs frequently, so, no mode.

8. The following observations are arranged in ascending order. The median of the data is 25, find the value of x .

17, x , 24, $x+7$, 35, 36, 46

$$\text{Given, } \tilde{x} = 25$$

Since, number of elements is 7,

$$\text{So, } \text{Median} = \left\{ \frac{n+1}{2} \right\}^{\text{th}} \text{ term} = \frac{8}{2} = 4^{\text{th}} \text{ term}$$

$$\Rightarrow x+7 = 25$$

$$\Rightarrow x = 18$$

9. In the above problem, how would you approach the problem if numbers are not in ascending order? What are the possible values of X then?

(Don't know the answer)

(-from the doubt clearing explanation) —

Since, no. of elements is a odd number that is 7, so, median cannot be the avg of two numbers.

The median value is 25 and none of the number in the list is 25, so, either X is 25 or $X + 7 = 25$.

If we keep X as 25, then, we will have something like,

17, 24, (25), 32, 35, 36, 46

↑ Median

We see, a disturbance in the distribution, since, before and after 25, equal number of elements should reside. So, $X = 25$ is not the correct answer.

If we give, $X + 7 = 25 \Rightarrow X = 18$.
the list will be,

17, 18, 24, (25), 35, 36, 46

↑ Median

Now, on both sides, we have equal number of elements. So, $X = 18$.

10. In which of these situations would you use the mode to measure the central tendency of the ~~mode~~ data.

(a) Justin records the temperature at noon every day for two weeks and wants to know the temperature of a typical day.

(b) Would you use the mean of these situations?

(c) Juliana measures the height of all the girls, on her Soccer team and wants to know the typical height of a soccer player.

(d) Sam asks the students in her class to identify their favorite color and wants to know which color is the most common.

In point d, we will be using mode, because, it is a categorical value and mode will tell the most favorite color.