Assignment 1
AI1110: Probability and Random Variables

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Question 3(c):

The marks of 10 students of a class in an examination arranged in ascending order is as follows:

13, 35, 43, 46, x, x+4, 55, 61, 71, 80.

If the median marks is 48, find the value of x. Hence find the mode of the given data.

Solution:

Required:

(i) value of x.

(ii) mode of the data.

Median(definition): it is the middle number in a sorted ordered list of number.

i.e., if n be the number of entries in given data then median of the data is:

(i) if n = odd, Median = $(\frac{n}{2})^{th}$ element.

(ii) if (n = even), Median = average of $(\frac{n}{2})^{th}$ and $(\frac{n+1}{2})^{th}$ elements.

As, Here the value of n is odd.

therefore,

$$Median = \frac{(x) + (x+4)}{2}. \tag{1}$$

$$Median = \frac{(2x+4)}{2}. \tag{2}$$

$$Median = x + 2. \tag{3}$$

$$x = Median - 2 \tag{4}$$

$$x = 48 - 2 \tag{5}$$

$$x = 46. \tag{6}$$

therefore, $\underline{x = 46.}$

Requirement (ii) : mode of the data.(Histogram)

Converting given set of sorted numbers into Class Intervals(to use Histogram method to find mode):

Given data :13, 35, 43, 46, 46, 50, 55, 61, 71, 80.

CONVERTED Class intervals and frequency table:

Class Interval	frequency
0-10	0
10-20	1
20-30	0
30-40	1
40-50	3
50-60	2
60-70	1
70-80	2

TABLE I

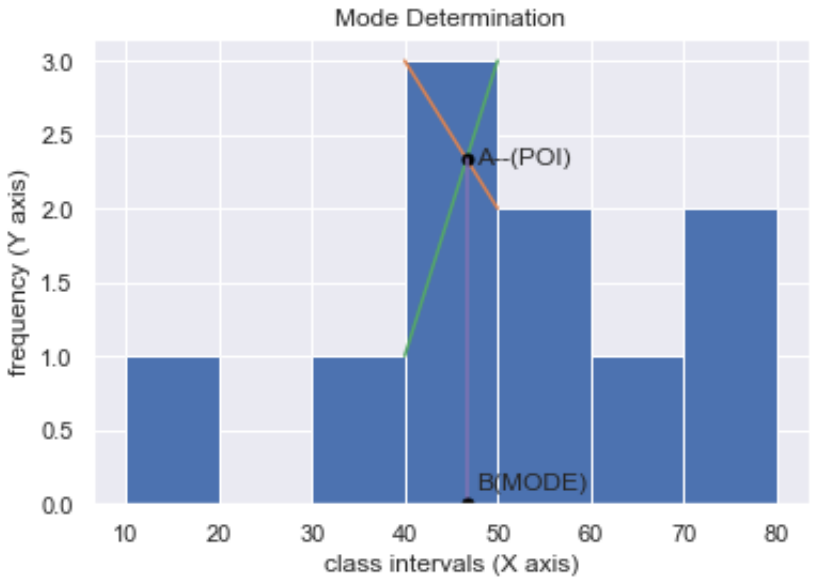

Fig. 1. Graph

Hence, Mode(approx) of given data = 46.66

i.e., **mode = 46.**