Statistics Formative assessment

Fill in the blank

(a) The mean of 50 numbers is 18, the new mean will be …. if each observation is increased by 4 (22/24/20)

(b) The sum of deviations of a set of values {a,b,c,d,e,f,g.h.i……} n items measured from 26 is -10 and the sum of deviations of the values from 20 is 50. The value of n is …(10/12/9) And mean of the items is ……. (19/18/17/25)

(c) For a given data with 110 observations the 'less than ogive' and the 'more then ogive' intersect at (18, 20). The median of the data is …… (18/20/19)

(d) The curve drawn by taking upper limits along x-axis and cumulative frequency along y-axis is ……….(less than ogive /more than ogive)

(e) The mean of five numbers is 40. If one number is excluded, their mean becomes 28. The excluded number is……. (68 / 88)

(f) The modal class of the grouped size frequency table given below is

5-5.2	5.2-5.4	5.4-5.6	5.6-5.8	5.8-6.0
34	4	4	4	6

…. ……

Solution
(a) 24

$$\frac{\sum x}{\sum n} = 18$$

Now when each number is increased by 4,we have

$$\frac{\sum(x + 4)}{\sum n} = M$$

$$\frac{\sum x}{\sum n} + 4 = M$$

So M=22

(b) 10,25

$$\sum (x - 26) = -10$$
$$\sum (x - 20) = 50$$

$$\sum (x) - 26n = -10$$
$$\sum (x) - 20n = 50$$

Subtracting ,we get
-6n=-60 => n=10
So $\sum x = 250$
⇨ Mean=250/10=25

(c) 18.   Median is the point of intersection of ogive curves
(d) less than ogive curve
(e) 88
Sum of five number=5Xmean=200
Sum of four number=4Xmean=112
Subtracting, we get the number=88
f) Modal class is 5-5.2

True or False statement

The following shows the class interval and respective frequency

Class interval	5-15	15-25	25-35	35-45	45-55	55-65
Frequency	6	11	21	23	14	4

a) The mean is 33
b) The modal class is 35-45
c) The mode is 34
 d) The Frequency for less than is 35 is 38
e) The median is
Solution

Lets find the mean value first

Class interval	5-15	15-25	25-35	35-45	45-55	55-65
Frequency	6	11	21	23	14	5
Class mark	10	20	30	40	50	60
$F_i x_i$	60	220	630	920	700	300

Mean is given by

$$M = \frac{\sum f_i x_i}{\sum f_i} = \frac{2830}{80} = 35.375$$

The class having highest frequency is called the Modal class, so Modal class is 35-45

$$M_o = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) h$$

Where
l = lower limit of the modal class,
h = size of the class interval (assuming all class sizes to be equal),
f_1 = frequency of the modal class,
f_0 = frequency of the class preceding the modal class,
f_2 = frequency of the class succeeding the modal class.

Now l=35 h=10 f_1=23 f_0=21 and f_2=14

So substituting all the values we get
M_0=36.81

Now
3 Median=Mode +2 Mean
So median =Mode +2 Mean)/3=35.853
a) False. I

b) True
c) False
d) True.
e) False

Multiple choice Questions

3) While computing mean of grouped data, we assume that the frequencies are

a) centred at the upper limits of the classes
b) centred at the lower limits of the classes
c) centred at the class-marks of the classes
d) evenly distributed over all the classes

Solution (c)

Question 4
Which of the following is the measure of central tendency?
a) Mean
b)Mode
c) Median

d) Range

Solution (a) ,(b),(c)

Question 5
For drawing a frequency polygon of a continuous frequency distribution, we plot the
Points whose ordinates are the frequencies of the respective classes and abscissae
are respectively :

a) class marks of the classes
b) upper limits of preceding classes
c) lower limits of the classes
d) upper limits of the classes
Solution (a)

Question 6
Find the mean of 32 numbers given mean of ten of them is 12 and the mean of
other 20 is 9. And last 2 number is 10
a) 10
b) 12
c) 13
d) 14

Solution (a)

Mean of 10 number =12
   ⇨ Sum of these 10 numbers =120
Mean of 20 number =9
   ⇨ Sum of these 20 numbers =180

Mean of 2 number =10
   ⇨ Sum of these 2 numbers =20
Mean of 32 number= Sum of all number/32=(120+180+20)/32=10

Question 7
The median and mean of the first 10 natural numbers.
a) 5.5,5.5
b) 5.5,6
c) 5,6
d) None of these

Solution (a)
Mean =5.5

Median is mean of 5 and 6 th term, So 5

Question 8
Anand says that the median of 3, 14, 19, 20, 11 is 19. What doesn't the Anand understand about finding the median?
a) The dataset should be ascending order
b) Highest no in the dataset is the median
c) Average of lowest and highest is the median
d) None of these

Solution (a)

Question 9
The following observations are arranged in ascending order :
20, 23, 42, 53, x, x + 2, 70, 75, 82, 96
If the median is 63, find the value of x.
a) 62
b) 64
c) 60
d) None of these

Solution (a)

Median is mean of 5 and 6 term
So x+1=63
X=62

Question 10
The mean of 20 observations was 60. It was detected on rechecking that the value of 125 was wrongly copied as 25 for computation of mean. Find the correct mean

a) 67
b) 66
c) 65
d) None of the above

Solution
Let x be the sum of observation of 19 numbers leaving 125,
Then
X+25=20*60=1200

Now
X+125=20*y=20y

Subtracting
125-25=20y-1200
20y=1300
y=65

Question 11

Compute the Median for the given data

Class – interval	100-110	110-120	120-130	130-140	140-150	150-160
Frequency	6	35	48	72	100	4

Solution

First calculate the Class mark and cumulative frequency of the data

Class – interval	100-110	110-120	120-130	130-140	140-150	150-160
Frequency	6	35	48	72	100	5
Class Mark	105	115	125	135	145	155
Cummulative Frequency	6	41	89	161	261	266

We have N=266, So N/2=133,Cummulative frequency first greater than 133,lies in class 130-140
<u>So median class is 130-140</u>

Now
Median is calculated as

$$M_m = l + \left(\frac{\frac{n}{2} - cf}{f} \right) h$$

Where

l = lower limit of median class,
n = number of observations,
cf = cumulative frequency of class preceding the median class,
f = frequency of median class,
h = class size (assuming class size to be equal)

Here l=130 n=266 cf=89 f=72 h=10
Substituting these

M_m= 130+(133-89)x10/72=136.11

Match the column

A histogram	is the diagram showing a system of connections

	or interrelations between two or more things by using bars
Discontinuous Frequency Distribution.	A frequency distribution in which the upper limit of one class coincides from the lower limit of the succeeding class
Continuous Frequency Distribution.	Is the bar graph such that the area over each class interval is proportional to the relative frequency of data within this interval.
Ogive is the graph of	Is a set of adjacent rectangles whose areas are proportional to the frequencies of a given continuous frequency distribution?
	lower/upper limits and cumulative frequency