Statistics

Question 1.
If the varience of the data is 121 then the standard deviation of the data is
(a) 121
(b) 11
(c) 12
(d) 21

Answer: (b) 11
Given, varience of the data = 121
Now, the standard deviation of the data = √(121)
= 11

Question 2.
The mean deviation from the mean for the following data: 4, 7, 8, 9, 10, 12, 13 and 17 is
(a) 2
(b) 3
(c) 4
(d) 5

Answer: (b) 3
Mean = (4 + 7 + 8 + 9 + 10 + 12 + 13 + 17)/10 = 80/10 = 8
$|x_i$ – mean|= |4 – 10| + |7 – 10| + |8 – 10| + |9 – 10| + |10 – 10| + |12 – 10| + |13 – 10| + |17 – 10|
= 6 + 3 + 2 + 1 + 0 + 2 + 3 + 7 = 24
Now, mean deviation form mean = 24/8 = 3

Question 3.
The mean of 1, 3, 4, 5, 7, 4 is m the numbers 3, 2, 2, 4, 3, 3, p have mean m – 1 and median q. Then, p + q =
(a) 4
(b) 5
(c) 6
(d) 7

Answer: (d) 7
The mean of 1, 3, 4, 5, 7, 4 is m
⇒ $(1 + 3 + 4 + 5 + 7 + 4)/6 = m$
⇒ $m = 24/6$
⇒ $m = 4$
The numbers 3, 2, 2, 4, 3, 3, p have mean m – 1
⇒ $(3 + 2 + 2 + 4 + 3 + 3 + p)/7 = m - 1$
⇒ $(17 + p)/7 = 4 - 1$
⇒ $(17 + p)/7 = 3$
⇒ $17 + p = 7 \times 3$
⇒ $17 + p = 21$
⇒ $p = 21 - 17$
⇒ $p = 4$
The numbers 3, 2, 2, 4, 3, 3, p have median q.
⇒ The numbers 2, 2, 3, 3, 3, 4, 4 have median q
⇒ $(7 + 1)/2$ th term = q
⇒ 4th term = q
⇒ $q = 3$
Now $p + q = 4 + 3 = 7$

Question 4.
If the difference of mode and median of a data is 24, then the difference of median and mean is
(a) 12
(b) 24
(c) 8
(d) 36

Answer: (a) 12
Given the difference of mode and median of a data is 24
⇒ Mode – Median = 24
⇒ Mode = Median + 24
Now, Mode = 3 × Median – 2 × Mean
⇒ Median + 24 = 3 × Median – 2 × Mean
⇒ 24 = 3 × Median – 2 × Mean – Median
⇒ 24 = 2 × Median – 2 × Mean
⇒ Median – Mean = 24/2
⇒ Median – Mean = 12

Question 5.
The coefficient of variation is computed by
(a) S.D/.Mean × 100
(b) S.D./Mean
(c) Mean./S.D × 100
(d) Mean/S.D.

Answer: (b) S.D./Mean
The coefficient of variation = S.D./Mean

Question 6.
The geometric mean of series having mean = 25 and harmonic mean = 16 is
(a) 16
(b) 20
(c) 25
(d) 30

Answer: (b) 20
The relationship between Arithmetic mean (AM), Geometric mean (GM) And Harmonic mean (HM) is
$GM^2 = AM \times HM$
Given AM = 25
HM = 16
So $GM^2 = 25 \times 16$
$\Rightarrow GM = \sqrt{(25 \times 16)}$
$= 5 \times 4$
$= 20$
So, Geometric mean = 20

Question 7.
When tested the lives (in hours) of 5 bulbs were noted as follows: 1357, 1090, 1666, 1494, 1623. The mean of the lives of 5 bulbs is
(a) 1445
(b) 1446
(c) 1447
(d) 1448

Answer: (b) 1446
Given, lives (in hours) of 5 bulbs were noted as follows: 1357, 1090, 1666, 1494, 1623
Now, mean = (1357 + 1090 + 1666 + 1494 + 1623)/5

= 7230/5
= 1446

Question 8.
Mean of the first n terms of the A.P. a + (a + d) + (a + 2d) + ……… is
(a) a + nd/2
(b) a + (n – 1)d
(c) a + (n − 1)d/2
(d) a + nd

Answer: (c) a + (n − 1)d/2
Mean of the first n terms of the A.P. {a + (a + d) + (a + 2d) + ……… a + (n-1)d}/n
= (n/2){2a + (n – 1)d}/n
= (1/2){2a + (n – 1)d}
= a + (n – 1)d/2

Question 9.
The mean of a group of 100 observations was found to be 20. Later on, it was found that three observations were incorrect, which was recorded as 21, 21 and 18. Then the mean if the incorrect observations are omitted is
(a) 18
(b) 20
(c) 22
(d) 24

Answer: (b) 20
Given mean of 100 observations is 20
Now
$\sum xi/100 = 20$ ($1 <= i <= 100$)
$\Rightarrow \sum xi = 100 \times 20$
$\Rightarrow \sum xi = 2000$
3 observations 21, 21 and 18 are recorded incorrectly.
So $\sum xi = 2000 – 21 – 21 – 18$
$\Rightarrow \sum xi = 2000 – 60$
$\Rightarrow \sum xi = 1940$
Now new mean is
$\sum xi/100 = 1940/97 = 20$
So, the new mean is 20

Question 10.
If covariance between two variables is 0, then the correlation coefficient between them is
(a) nothing can be said
(b) 0
(c) positive
(d) negative

Answer: (b) 0
The relationship between the correlation coefficient and covariance for two variables as shown below:
$r_{(x, y)} = COV(x, y)/\{s_x \times s_y\}$
$r_{(x, y)}$ = correlation of the variables x and y
COV (x, y) = covariance of the variables x and y
s_x = sample standard deviation of the random variable x
s_y = sample standard deviation of the random variable y
Now given COV (x, y) = 0
Then $r_{(x, y)} = 0$

Question 11.
The mean of 1, 3, 4, 5, 7, 4 is m the numbers 3, 2, 2, 4, 3, 3, p have mean m – 1 and median q. Then, p + q =
(a) 4
(b) 5
(c) 6
(d) 7

Answer: (d) 7
The mean of 1, 3, 4, 5, 7, 4 is m
$\Rightarrow (1 + 3 + 4 + 5 + 7 + 4)/6 = m$
$\Rightarrow m = 24/6$
$\Rightarrow m = 4$
The numbers 3, 2, 2, 4, 3, 3, p have mean m – 1
$\Rightarrow (3 + 2 + 2 + 4 + 3 + 3 + p)/7 = m - 1$
$\Rightarrow (17 + p)/7 = 4 - 1$
$\Rightarrow (17 + p)/7 = 3$
$\Rightarrow 17 + p = 7 \times 3$
$\Rightarrow 17 + p = 21$
$\Rightarrow p = 21 - 17$
$\Rightarrow p = 4$
The numbers 3, 2, 2, 4, 3, 3, p have median q.

⇒ The numbers 2, 2, 3, 3, 3, 4, 4 have median q
⇒ (7 + 1)/2th term = q
⇒ 4th term = q
⇒ q = 3
Now p + q = 4 + 3 = 7

Question 12.
In a series, the coefficient of variation is 50 and standard deviation is 20 then the arithmetic mean is
(a) 20
(b) 40
(c) 50
(d) 60

Answer: (b) 40
Given, in a series, the coefficient of variation is 50 and standard deviation is 20
⇒ (standard deviation/AM) × 100 = 50
⇒ 20/AM = 50/100
⇒ 20/AM = 1/2
⇒ AM = 2 × 20
⇒ AM = 40
So, the arithmetic mean is 40

Question 13.
The coefficient of correlation between two variables is independent of
(a) both origin and the scale
(b) scale but not origin
(c) origin but not scale
(d) neither scale nor origin

Answer: (a) both origin and the scale
The coefficient of correlation between two variables is independent of both origin and the scale.

Question 14.
The geometric mean of series having mean = 25 and harmonic mean = 16 is
(a) 16
(b) 20
(c) 25
(d) 30

Answer: (b) 20
The relationship between Arithmetic mean (AM), Geometric mean (GM) And Harmonic mean (HM) is
$GM^2 = AM \times HM$
Given AM = 25
HM = 16
So $GM^2 = 25 \times 16$
$\Rightarrow GM = \sqrt{(25 \times 16)}$
$= 5 \times 4$
$= 20$
So, Geometric mean = 20

Question 15.
One of the methods of determining mode is
(a) Mode = 2 Median – 3 Mean
(b) Mode = 2 Median + 3 Mean
(c) Mode = 3 Median – 2 Mean
(d) Mode = 3 Median + 2 Mean

Answer: (c) Mode = 3 Median – 2 Mean
We can calculate the mode as
Mode = 3 Median – 2 Mean

Question 16.
If the correlation coefficient between two variables is 1, then the two least square lines of regression are
(a) parallel
(b) none of these
(c) coincident
(d) at right angles

Answer: (c) coincident
If the correlation coefficient between two variables is 1, then the two least square lines of regression are coincident

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Question 17.
The mean and variance of 7 observations are 8 and 16, respectively. If five of the observations are 2, 4, 10, 12, 14. then the remaining two observations are
(a) 4, 6
(b) 6, 8

(c) 8, 10
(d) 10, 12

Answer: (b) 6, 8
Given mean and variance of 7 observations are 8 and 16.
Five observations are 2, 4, 10, 12, 14.
Let the other two observations are x and y.
So 7 observations are : 2, 4, 10, 12, 14 ,x ,y
Now
Mean = $(2 + 4 + 10 + 12 + 14 + x + y)/7$
$\Rightarrow 8 = (2 + 4 + 10 + 12 + 14 + x + y)/7$
$\Rightarrow 8 \times 7 = 2 + 4 + 10 + 12 + 14 + x + y$
$\Rightarrow 56 = 42 + x + y$
$\Rightarrow x + y = 56 – 42$
$\Rightarrow x + y = 14$ ………….. 1
Again Given varience = 16
$\Rightarrow (1/7) \times \sum (xi – mean)^2 = 16$ (7 <= i <= 1)
$\Rightarrow \sum (xi – mean)^2 = 16 \times 7$
$\Rightarrow \sum (xi – mean)^2 = 112$
$\Rightarrow \{(2 – 8)^2 + (4 – 8)^2 + (10 – 8)^2 + (12 – 8)^2 + (14 – 8)^2 + (x – 8)^2 + (y – 8)^2\} = 112$
$\Rightarrow \{(-6)^2 +(-4)^2 + (2)^2 + (4)^2 + (6)^2 + x^2 + 64 – 16x + y^2 + 64 – 16y \} = 112$
$\Rightarrow \{36 + 16 + 4 + 16 + 36 + x^2 + y^2 + 64 + 64 – 16(x + y) \} = 112$
$\Rightarrow \{108 + x^2 + y^2 + 128 – (16 \times 14)\} = 112$ (since $x + y = 14$)
$\Rightarrow \{108 + x^2 + y^2 + 128 – 224\} = 112$
$\Rightarrow x^2 + y^2 + 236 – 224 = 112$
$\Rightarrow x^2 + y^2 + 12 = 112$
$\Rightarrow x^2 + y^2 = 12 – 12$
$\Rightarrow x^2 + y^2 = 100$…………….2
Squaring equation 1, we get
$(x + y)^2 = 196$
$\Rightarrow x^2 + y^2 + 2xy = 196$
$\Rightarrow 100 + 2xy = 196$
$\Rightarrow 2xy = 196 – 100$
$\Rightarrow 2xy = 96$
$\Rightarrow xy = 96/2$
$\Rightarrow xy = 48$ …………. 3
Now $(x – y)^2 = x^2 + y^2 – 2xy$
$= 100 – 2 \times 48$
$= 100 – 96$
$= 4$
$\Rightarrow x – y = \sqrt{2}$

⇒ $x - y = 2, -2$
case 1: when $x - y = 2$ and $x + y = 14$
After solving it, we get $x = 8, y = 6$
case 2: when $x - y = -2$ and $x + y = 14$
After solving it, we get $x = 6, y = 8$
So, the two numbers are 6 and 8

Question 18.
Range of a data is calculated as
(a) Range = Max Value – Min Value
(b) Range = Max Value + Min Value
(c) Range = (Max Value – Min Value)/2
(d) Range = (Max Value + Min Value)/2

Answer: (a) Range = Max Value – Min Value
Range of a data is calculated as
Range = Max Value – Min Value

Question 19.
Mean deviation for n observations $x_1, x_2, \ldots, x_n$ from their mean x is given by
(a) $\sum(x_i - x)$ where $(1 \le i \le n)$
(b) $\{\sum|x_i - x|\}/n$ where $(1 \le i \le n)$
(c) $\sum(x_i - x)^2$ where $(1 \le i \le n)$
(d) $\{\sum(x_i - x)^2\}/n$ where $(1 \le i \le n)$

Answer: (b) $\{\sum|x_i - x|\}/n$ where $(1 \le i \le n)$
Mean deviation for n observations $x_1, x_2, \ldots, x_n$ from their mean x is calculated as
$\{\sum|x_i - x|\}/n$ where $(1 \le i \le n)$

Question 20.
If the mean of the following data is 20.6, then the value of p is
x: 10 15 p 25 35
f: 3 10 25 7 5
(a) 30
(b) 20
(c) 25
(d) 10

Answer: (b) 20

Mean = $\sum f_i \times xi / \sum f_i$

$\Rightarrow 20.6 = (10 \times 3 + 15 \times 10 + p \times 25 + 25 \times 7 + 35 \times 5)/(3 + 10 + 25 + 7 + 5)$

$\Rightarrow 20.6 = (30 + 150 + 25p + 175 + 175)/50$

$\Rightarrow 20.6 = (530 + 25p)/50$

$\Rightarrow 530 + 25p = 20.6 \times 50$

$\Rightarrow 530 + 25p = 1030$

$\Rightarrow 25p = 1030 – 530$

$\Rightarrow 25p = 500$

$\Rightarrow p = 500/25$

$\Rightarrow p = 20$

So, the value of p is 20
