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# Basic stats

# 8th semester Submited to Sir Raza Ahmad

Question 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Class Boundries** | **Frequency** | **Mid Point (x)** | **fx** | **f**$×$**log** | $$\frac{f}{x}$$ |
| 1 | 4 | 1/2=0.5 | 2 | -1.20 | 8 |
| 2 | 13 | 1 | 13 | 0 | 13 |
| 3 | **9** | **0.66** | **5.94** | **-1.62** | **13.63** |
| 4 | 4 | 2 | 8 | 1.20 | 2 |
| 5 | 1 | 2.5 | 2.5 | 0.39 | 0.4 |
|  |  31 |  |  31.44 | - 1.23 | 37.03 |

1. **Arthimetic Mean =** $\frac{∑fx}{ ∑f}$ **=** $\frac{31.44}{31 }$ **= 1.01 answer**
2. **Geometric Mean = Antilog (** $\frac{∑f×log }{∑f}$ **) =** $\frac{-1.23}{31}$ **= 0.0396**

 **= Antilog (0.0396) = 0.912 answer.**

**3.Harmonic Mean** $\frac{∑f}{ ∑f/x}$ **=** $\frac{31}{37.03}$ **= 0.837 answer**

Question 1 b

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Marks**  | **Frequency** | **Mid Point (x)** | **fx** | **f**$×$**log(x)** | $$\frac{f}{x}$$ |
| 0──9 | 2 | 0+9/2=4.5 | 9 | 1.306 | 0.44 |
| 10──19 | 31 | 14.5 | 449.5 | 36.002 | 2.137 |
| 29──29 | 73 | **24.5** | **1788** | **101.40** | **16.222** |
| 30──9 | 85 | 34.5 | 2932 | 130.71 | 2.463 |
| 40──49 | 28 | 44.5 | 1246 | 46.15 | 0.629 |
|  |  219 |  | 6,425 |  316 |  22 |

1. **Arthimetic Mean =** $\frac{∑fx}{ ∑f}$ **=** $\frac{6425}{219 }$ **= 29.33 answer**
2. **Geometric Mean = Antilog (** $\frac{∑f×log }{∑f}$ **) =** $\frac{316}{219}$ **= 1.44**

 **= Antilog (1.44) = 27.54answer.**

**3.Harmonic Mean** $\frac{∑f}{ ∑f/x}$ **=** $\frac{219}{22}$ **= 9.954 answer**

Question 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No of children per family**  | **No of families**  | **Class boundries** | **Mid Point (x)** | **fx** | **Cf** |
| 1 | 4 | 0.50─1.50 | 1/2=0.5 | 2 | 4 |
| 2 | 13 | 1.5──2.5 | 1 | 13 | 17 |
| 3 | **9** | **2.5**──3.5 | **0.66** | **5.94** | **26** |
| 4 | 4 | 3.5──4.5 | 2 | 8 | 30 |
| 5 | 1 | 4.5──5.5 | 2.5 | 2.5 | 31 |
|  | $∑f$ 31 |  |  | $∑f$X 31.44 |  |

Median formula = $Ẍ=(\frac{∑f}{ 2}$ **)th**

$Ẍ=(\frac{31}{ 2}$ **)th**  15.5

Ẍ= L+$\frac{H }{f}$ $(\frac{∑f}{ 2}- c $ **)**

Ẍ= 1.5+ $\frac{1 }{13}$ $(\frac{31}{ 2}- 4$ **)**

Ẍ= 1.5 + 0.0769 (15.5-4) = Ẍ= 1.5+ 0.0769(11.5)

Ẍ= 1.5+0.88435 = 2.38 answer

Mode Formula =L+ $(\frac{fm-f1}{2(fm)-f1-f2 }$) x h

=1.5+ $(\frac{13-4}{2(13)-4-9 }$) x 1

=1.5+ $(\frac{9}{26-13 }$) x 1

=1.5+ $(\frac{9}{13 }$) x 1 =1.5 + 0.6923 = **2.1 Answer**

Question 2b

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Marks**  | **Frequency** | **Mid Point (x)** | **fx** | **Cf**  | **Class Boundries**  |
| 0──9 | 2 | 0+9/2=4.5 | 9 | 2 | -0.5──9.5 |
| 10──19 | 31 | 14.5 | 449.5 | 33 | 9.5──19.5 |
| 29──29 | 73 | **24.5** | **1788** | 106 | 19.5──29.5 |
| 30──9 | 85 | 34.5 | 2932 | 191 | 29.5──39.5 |
| 40──49 | 28 | 44.5 | 1246 | 219 | 39.5──49.5 |
|  |  219 |  | 6,425 |  |  |

Median formula = $Ẍ=(\frac{∑f}{ 2}$ **)th**  == $Ẍ=(\frac{219}{ 2}$ **)th = 109.5**

Ẍ= 19.5+$\frac{10 }{73}$ $(\frac{219}{ 2}- 33$**)**

Ẍ= 19.5 + 0.136 (109.5-33)

Ẍ= 19.5 + 0.136(76.5)

Ẍ= 19.5 + 10.40

**Ẍ= 29.9 answer**

Mode Formula =L+ $(\frac{fm-f1}{2(fm)-f1-f2 }$) x h

= 29.5+ $(\frac{85-73}{2(85)-73-28 }$) x 10

=29.5+ $(\frac{85-73}{2(85)-73-28 }$) x 10

=29.5+ $(\frac{12}{(190)-73-28 }$) x 10

=29.5+ $(\frac{12}{190-101 }$) x 10

=29.5+ $(\frac{12}{89 }$) x 10

=29.5+ 0.1348 x 10

= 29.5+1.348 = **30.8 answer**

Question 3a

**Interquartile range**

|  |  |  |  |
| --- | --- | --- | --- |
| **No of children per family**  | **No of families**  | **Cf** | **Class boundries** |
| 1 | 4 | 4 | 0.50─1.50 |
| 2 | 13 | 17 | 1.5──2.5 |
| 3 | **9** | **26** | **2.5**──3.5 |
| 4 | 4 | 30 | 3.5──4.5 |
| 5 | 1 | 31 | 4.5──5.5 |
|  | $∑f$ 31 |  |  |

**Q1 =** $\frac{31}{5}$ **= 6.5 7th value**

**Q3 =** $\frac{31}{5}$ **x 19.5**  20th value

**Q1 =**

 0.50 7 8th

**Q1 =** $\frac{Q1-0.50}{1.50-0.50}$ **=** $\frac{6}{1}$= Q1 3 x$\frac{6}{1}$ **+** 0.50

Q1 3 x **6.5 = 19.5 answer**

**Q3 =**

 19 20 21

**=** $\frac{Q3-2.50}{3.50-2.50}$ **=** $\frac{17}{1}$**+** 2.50 = Q3 3 x **=** $\frac{17}{1}$**+** 2.50

**= Q3 3 x19.5 = 58.5 Answer**

**Qr = Q3 – Q1 = 58 – 19.5 = 38**

Question 4

**: RANGE**

In statistics and mathematics, the range is the difference between the maximum and minimum values of a data set and serve as one of two important features of a data set. The formula for a range is the maximum value minus the minimum value in the dataset, which provides statisticians with a better understanding of how varied the data set is.The calculation of the range is very straightforward. All we need to do is find the difference between the largest data value in our set and the smallest data value. Stated succinctly we have the following formula: Range = Maximum Value–Minimum Value. For example, the data set 4,6,10, 15, 18 has a maximum of 18, a minimum of 4 and a range of 18-4 = 14.

**Quartiles**

Quartiles are the values that divide a list of numbers into quarters:

Put the list of numbers in orderThen cut the list into four equal partsThe Quartiles are at the "cuts"Interquartile Range.

The interquartile range (IQR) is a measure of variability, based on dividing a data set into quartiles.

Quartiles divide a rank-ordered data set into four equal parts. The values that divide each part are called the first, second, and third quartiles; and they are denoted by Q1, Q2, and Q3, respectively.

Q1 is the "middle" value in the first half of the rank-ordered data set.Q2 is the median value in the set.Q3 is the "middle" value in the second half of the rank-ordered data set.

**the semi-interquartile**

 range is one-half the difference between the first and third quartiles. It is half the distance needed to cover half the scores.  The semi-interquartile range is affected very little by extreme scores.  This makes it a good measure of spread for skewed distributions. It is obtained by evaluating Q3&#x2212;Q12" role="presentation" style="display: inline; font-style: normal; font-weight: normal; line-height: normal; font-size: 16px; text-indent: 0px; text-align: left; text-transform: none; letter-spacing: normal; word-spacing: normal; overflow-wrap: normal; white-space: nowrap; float: none; direction: ltr; max-width: none; max-height: none; min-width: 0px; min-height: 0px; border: 0px; padding: 0px; margin: 0px; position: relative;">Q3−Q12Q3−Q12 .

The mid-quartile range is the numerical value midway between the first and third quartile.  It is one-half the sum of the first and third quartiles.  It is obtained by evaluating Q3+Q12" role="presentation" style="display: inline; font-style: normal; font-weight: normal; line-height: normal; font-size: 16px; text-indent: 0px; text-align: left; text-transform: none; letter-spacing: normal; word-spacing: normal; overflow-wrap: normal; white-space: nowrap; float: none; direction: ltr; max-width: none; max-height: none; min-width: 0px; min-height: 0px; border: 0px; padding: 0px; margin: 0px; position: relative;">Q3+Q12Q3+Q12 .

(The median, midrange and mid-quartile are not always the same value, although they may be.)

**Variance** is the expected value of the squared variation of a random variable from its mean value, in probability and statistics. In an informal way, it estimates how far a set of numbers (random) are spread out from their mean average value

In statistics, the variance is equal to the square of standard deviation, which is another central tool and is represented by σ2, s2, or Var(X).

Variance meaning – It is a measure of how data points differ from the mean. According to layman’s terms, it is a measure of how far a set of data( numbers) are spread out from their mean (average) value.

For the purpose of solving questions, it is,

Var (X) = E[ ( X – μ))2]

The standard deviation is a measure of the spread of scores within a set of data. Usually, we are interested in the standard deviation of a population. However, as we are often presented with data from a sample only, we can estimate the population standard deviation from a sample standard deviation. These two standard deviations - sample and population standard deviations - are calculated differently. In statistics, we are usually presented with having to calculate sample standard deviations, and so this is what this article will focus on, although the formula for a population standard deviationWe are normally interested in knowing the population standard deviation because our population contains all the values we are interested in. Therefore, you would normally calculate the population standard deviation if: (1) you have the entire population or (2) you have a sample of a larger population, but you are only interested in this sample and do not wish to generalize your findings to the population.

The coefficient of variation (CV) is a measure of relative variability. It is the ratio of the standard deviation to the mean (average). For example, the expression “The standard deviation is 15% of the mean” is a CV.

The CV is particularly useful when you want to compare results from two different surveys or tests that have different measures or values. For example, if you are comparing the results from two tests that have different scoring mechanisms. If sample A has a CV of 12% and sample B has a CV of 25%, you would say that sample B has more variation, relative to its mean.

The Coefficient of Variation should only be used to compare positive data on a ratio scale. The CV has little or no meaning for measurements on an interval scale. Examples of interval scales include temperatures in Celsius or Fahrenheit, while the Kelvin scale is a ratio scale that starts at zero and cannot, by definition, take on a negative value

Answer 1 of Assignment dated 16.6.2020

93, 89,75,75,47, 73, 40, 100, 42, 39, 75, 13, 39, 89, 78, 32, 72, 51, 21, 92, 45, 29, 58, 16, 31, 6, 82, 76, 10, 10, 32, 2, 25, 98, 94, 93, 91, 68, 20, 19, 61, 37, 72, 61, 72, 19, 81, 78, 68, 20, 19, 61, 8, 11,13, 28,

15, 19, 23, 30 , 34 ,55, 99 2, 25, 98, 78, 32, 72 , 37, 72, 61, 72, 19, 81, 78, 88, 39, 47, 54, 6, 9, 17, 77,

88, 99, 59, 49, 39, 29, 19, 91, 68, 20, 25, 98, 78, 32, 72 , 37, 72

Lower class limit = 2

Highest class limit =100

Range = Highest class limit - Lower class limit

 N= 100

 Range = 100-2­­­­ = 98

#class = $\sqrt{n}$ = $\sqrt{100}$ = 10

Class width = range

 #class

Class width = 98 = 9.8 = 10

 10

|  |  |
| --- | --- |
| **Class Boundries** | Frequency |
| 2 ── 12 | 8 |
| 12──22 | 15 |
| 22──32 | **9** |
| 32──42 | 13 |
| 42──52 | 6 |
| 52──62 | 8 |
| 62──72 | 3 |
| 72──82 | 21 |
| 82──92 | 6 |
| 92──102 | 11 |

Answer 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Class Boundries** | **Frequency** | **Mid Point (x)** | **fx** | **f**$×$**log** | $$\frac{f}{x}$$ |
| 2 ── 11 | 8 | 2+12/2=6.5 | 52 | 6.76 | 1.14 |
| 12──21 | 15 | 16.5 | 255 | 18.45 | 0.882 |
| 22──31 | **9** | **26.5** | **243** | **12.88** | **0.333** |
| 32──41 | 13 | 36.5 | 481 | 20.38 | 0.351 |
| 42──51 | 6 | 46.5 | 282 | 10.03 | 0.127 |
| 52──61 | 8 | 56.5 | 456 | 14.04 | 0.140 |
| 62──71 | 3 | 66.5 | 201 | 5.47 | 0.044 |
| 72──81 | 21 | 76.5 | 1617 | 39.61 | 0.2727 |
| 82──91 | 6 | 86.5 | 522 | 11.63 | 0.068 |
| 92──101 | 11 | 96.5 | 1067 | 21.85 | 0.113 |
|  | **∑f =100** |  | **∑fx**=**5180**  | **∑f**$×$**log=** 161 | ∑$\frac{f}{x}$ =3 |

1. **Arthimetic Mean =** $\frac{∑fx}{ ∑f}$ **=** $\frac{5180}{100 }$ **=51.8 answer**
2. **Geometric Mean = Antilog (** $\frac{∑f×log }{∑f}$ **) =** $\frac{161}{100}$ **= 1.61**

 **= Antilog (1.61) = 40.73 answer.**

**3.Harmonic Mean** $\frac{∑f}{ ∑f/x}$ **=** $\frac{100}{3}$ **= 33.33 answer**