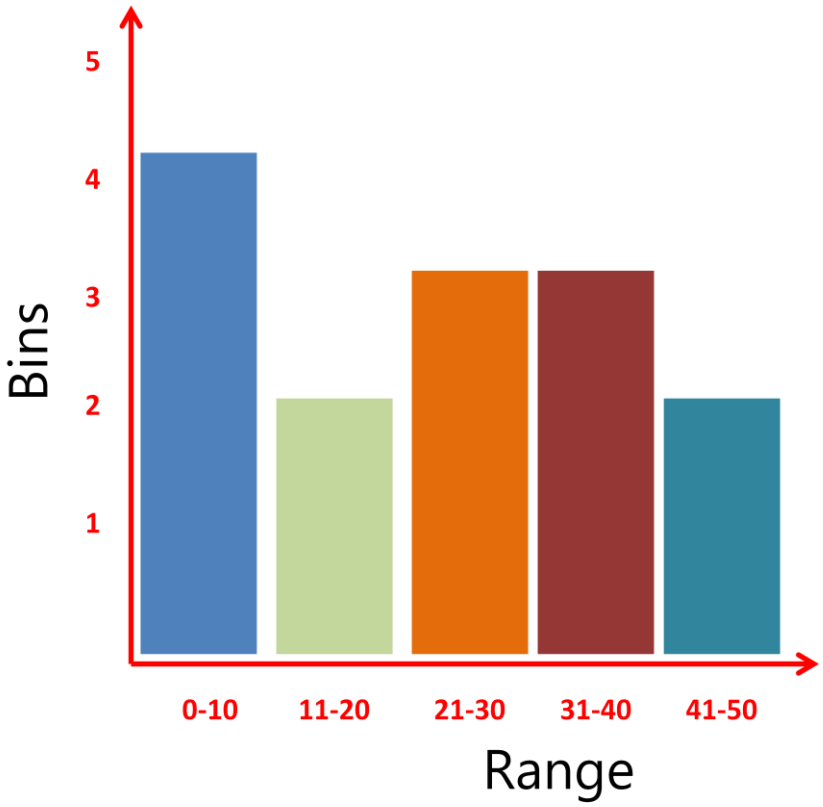
Class Date:- 10.05.2023 (Wednesday)

Assignment 3:-

Q1:- Draw a Histogram for below sample data set;
X = {1,8,7,9,24,12,17,21,37,26,33,39,49,45}

Sol:-
Given Data Set is; X = {1,8,7,9,24,12,17,21,37,26,33,39,49,45}
Let's arrange the data set in an Ascending Order;
X = {1,7,8,9,12,17,21,24, 26,33,37,39,45,49}
Let's make the bins as 5;



#Q2:
Determine Types of Variable

Sol:-

- Length of River – Continuous
- Age – Continuous
- Distance b/w A & B Points – Continuous

#Q3:

X = {23, 21, 20, 19, 24, 27, 28}

Find Variance & Standard Deviation

Sol:

Given Data Set is X = {23, 21, 20, 19, 24, 27, 28}

Rearrange the same in Ascending Order; X = {19,20,21,23,24,27,28}

Mean($\bar{X}$) of the above data is = Sum of All Data Points / No of Data Points

= (19+20+21+23+24+27+28) / 7

= 162/7

= 23.14

Standard Deviation (σ) of the above data is =

$$\sigma = \sqrt{\frac{\Sigma(\mathbf{X} - \boldsymbol{\mu})^2}{N}}$$

$\sigma = Population\ Standard$ Deviation

Σ = Sum of

X = Each Value in the Data Set

$\mu = Population\ Mean$

N = No of Values in the Population

$$\sigma = \sqrt{\frac{\Sigma(19 - 23.14)^2}{7}} + \sqrt{\frac{\Sigma(20 - 23.14)^2}{7}} + \sqrt{\frac{\Sigma(21 - 23.14)^2}{7}} + \sqrt{\frac{\Sigma(23 - 23.14)^2}{7}} + \sqrt{\frac{\Sigma(24 - 23.14)^2}{7}} + \sqrt{\frac{\Sigma(27 - 23.14)^2}{7}} + \sqrt{\frac{\Sigma(28 - 23.14)^2}{7}}$$

$\sigma = 1.56 + 1.18 + .8$

$\sigma = 3.54$

Type equation here.

Variance:

$$\sigma^2 = \frac{\Sigma(\mathbf{X_i} - \boldsymbol{\mu})^2}{N}$$

$$\sigma^2 = \frac{(\mathbf{19} - \mathbf{23.14})^2}{7} + \frac{(\mathbf{20} - \mathbf{23.14})^2}{7} + \frac{(\mathbf{21} - \mathbf{23.14})^2}{7} + \frac{(\mathbf{23} - \mathbf{23.14})^2}{7} + \frac{(\mathbf{24} - \mathbf{23.14})^2}{7} + \frac{(\mathbf{27} - \mathbf{23.14})^2}{7} + \frac{(\mathbf{28} - \mathbf{23.14})^2}{7}$$

$$\sigma^2 = \frac{17.14}{7} + \frac{9.85}{7} + \frac{4.58}{7} + \frac{0.02}{7} + \frac{.74}{7} + \frac{14.9}{7} + \frac{23.62}{7}$$

σ^2 = 70.85 / 7

σ^2 = 10.12

#Q4:-

Find out 5 number summary

X = {1,10,5,15,2,12,4,14}

Sol:-

Given dataset is x = {1,10,5,15,2,12,4,14}

In order to proceed further, rearrange the given data set in ascending order

X = {1,2,4,5,10,12,14,15}

Let's find the following

Min Value – 1

Q1 – Median of the Lower Half = (2+4)/2 = 3 *(* as the data set has 8 Values)*

Median (Q2) – Average of 5 & 10 = (5+10) /2 = 7.5

Q3 – Median of the Upper Half = (12_14)/2 = 13 *(* as the data set has 8 Values)*

Max Value – 15

IQR = 10

Lower Whisker = Q1 – (1.5)IQR = 3 – (1.5)10 = -12

Upper Whisker = Q3 + (1.5)IQR = 13 + (1.5)10 = 28

#Q5

X = {-8,1,2,4,5,6,8,15,20,120}

Find the 5 number Summary, Gaussian distribution, Standard Normal Distribution & Z Score?

Sol:-

Sorting the data set in ascending order: -8, 1, 2, 4, 5, 6, 8, 15, 20, 120

Min Value = -8

Q1 = Median of the Lower Half is (-8, 1, 2, 4, 5) = 2 *(* as the data set has 10 Values)*

Q2 (Median) = *(* as the data set has 8 Values)* = (5+6)/2 = 11/2 = 5.5

Q3 = Median of the Upper Half is (6, 8, 15, 20, 120) = 15 *(* as the data set has 10 Values)*

Max Value = 120

IQR = Q3 – Q1 = 15 – 2 = 13

Lower Whisker = Q1 – (1.5)IQR = 2 – (1.5) 13 = -17.5

Upper Whisker = Q3 + (1.5)IQR = 15 + (1.5)13 = 34.5

Mean of the above data is = Sum of All Data Points / No of Data Points

= (-8+1+2+4+5+6+8+15+20+120) /10

= 173/10

= 17.3

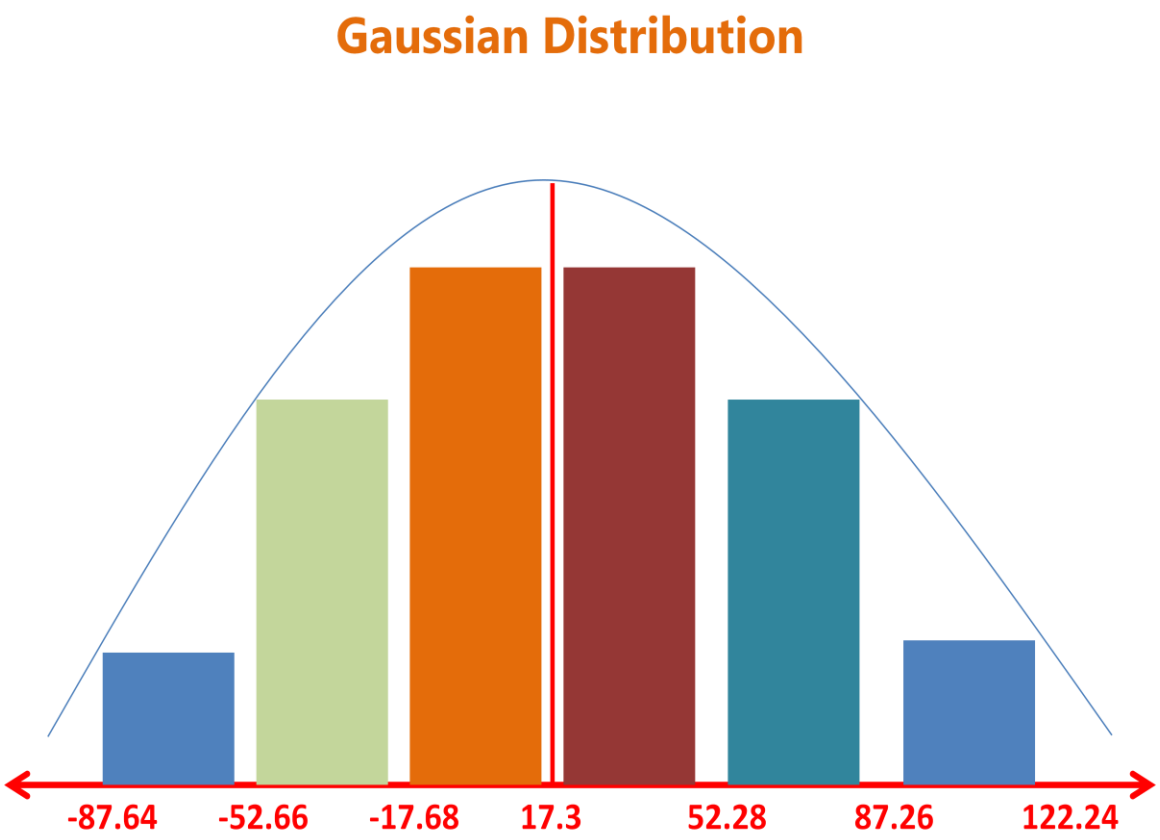
Standard Deviation of the above data is =

$$\sigma = \sqrt{\frac{\Sigma(\mathbf{X} - \boldsymbol{\mu})^2}{N}}$$

$$\sigma = \sqrt{\frac{(-8 - 17.3)^2}{10}} + \sqrt{\frac{(1 - 17.3)^2}{10}} + \sqrt{\frac{(2 - 17.3)^2}{10}} + \sqrt{\frac{(4 - 17.3)^2}{10}} + \sqrt{\frac{(5 - 17.3)^2}{10}} + \sqrt{\frac{(6 - 17.3)^2}{10}} + \sqrt{\frac{(8 - 17.3)^2}{10}} + \sqrt{\frac{(15 - 17.3)^2}{10}} + \sqrt{\frac{(20 - 17.3)^2}{10}} + \sqrt{\frac{(120 - 17.3)^2}{10}}$$

$\sigma = \sqrt{(25.3 + 16.3 + 15.3 + 13.3 + 12.3 + 11.3 + 9.3 + 2.3 + 2.7 + 102.7)/10}$

$\sigma = \sqrt{110.64/10} = 34.98$



Z Score:-

Mean = 17.3

Standard Deviation = 34.98

Z = $(x_i - \mu)/\sigma$

Z = (-8-17.3)/34.98 = -0.0723

Z = (1-17.3)/34.98 = -0.466

Z = (2-17.3)/34.98 = -0.437

Z = (4-17.3)/34.98 = -0.38
Z = (5-17.3)/34.98 = -0.35
Z = (6-17.3)/34.98 =-0.32
Z = (8-17.3)/34.98 = -0.266
Z = (15-17.3)/34.98 = -0.65
Z = (20-17.3)/34.98 = -0.077
Z = (120-17.3)/34.98 = 2.93

Thank You
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