**Exam: MID SEMESTER ASSIGNMENT**

**SPRING 2020**

**Subject: PROBABILITY STATISTICS**

**Name:** **AMIR ABBAS ID: 15499**

Q.1:

Ans.1:

|  |  |  |
| --- | --- | --- |
| Time taken in minutes | Frequency | Frequency cumulative |
| < 5 | 25 | 25 |
| < 10 | 45 | 70 |
| < 15 | 81 | 151 |
| < 20 | 143 | 294 |
| < 25 | 280 | 574 |
| < 30 | 349 | 923 |
| < 35 | 374 | 1297 |
| < 40 | 395 | 1692 |
| < 45 | 400 | 2092 |

1. 294 students taking less than 18 minutes.

(b)

|  |  |  |  |
| --- | --- | --- | --- |
| Classes | Frequency | Classes | Frequency |
| 0 – 5 | 25 | 25 – 30 | 349 |
| 5 – 10 | 45 | 30 – 35 | 374 |
| 10 – 15 | 81 | 35 – 40 | 395 |
| 15 – 20 | 143 | 40 – 45 | 400 |
| 20 – 25 | 280 |  |  |

Histogram:

**400**

**3800**

**360**

**340**

**320**

**300**

**280**

**260**

**20**

**240**

**220**

**200**

**180**

**160**

**140**

**120**

**100**

**80**

**60**

**40**

**0**

**Frequency**

 5 10 15 20 25 30 35 40 45

Q.2:

Ans.2:

|  |  |  |  |
| --- | --- | --- | --- |
| Group | Frequecy | Class Boundries | Frequency Cummulative |
| 361 – 370 | 02 | 360.5 – 370.5 | 02 |
| 371 – 380 | 03 | 370.5 – 380.5 | 05 |
| 381 – 390 | 06 | 380.5 – 390.5 | 11 |
| 391 – 400 | 07 | 390.5 – 400.5 | 18 |
| 401 – 410 | 05 | 400.5 – 410.5 | 23 |
| 411 – 420 | 03 | 410.5 – 420.5 | 26 |
| 421 – 430 | 03 | 420.5 – 430.4 | 29 |
| 431 – 440 | 01 | 430.5 – 440.5 | 30 |
| Total | 30 |  |  |

1. Mean = $\frac{sum of total observation}{No.of observation} $

 $= \frac{11914}{30}=397.133$

1. Mode = $l+\frac{f\_{m}-f\_{1}}{\left(f\_{m}-f\_{1}\right)+(f\_{m}-f\_{2})}×h$

As the 391 – 400 is a modal class because it has maximum frequency which is “7” therefore to compute the value in the formula so,

L = 390.5 , fm = 07 , f1 = 06 , f2 = 05 , h = 10

Now computing the values in the formula

Mode $= l+\frac{f\_{m}-f\_{1}}{\left(f\_{m}-f\_{1}\right)+(f\_{m}-f\_{2})}×h$

 $=390.5+\frac{07-06}{\left(07-06\right)+(07-05)}×10$

 $=390.5+\frac{10}{03}=\frac{1171.5+10}{3}=\frac{1181.5}{3}$

 Mode = 393.833

Quartiles:-

 Now to find Q1 , Q2 & Q3. As the number of observation is integer which is “30” therefore $\frac{n}{4}$ in value & $\left(\frac{n}{4}+1\right)$ in value which is

$\frac{30}{4}$ which become not integer therefor

For Q1:

 $\left(\frac{n}{4}+1\right)$ in value as

 $\left(\frac{30}{4}+1\right)=8$ in value which lies in the class 380.5 – 390.5 therefor

Q1 = $l+\frac{h}{f}\left(\frac{n}{4}-c\right)$

$ =380.5+\frac{10}{06}\left(\frac{30}{4}-05\right)$

 $=$ $380.5+4.166$

 $=384.66$

For Q2 :

 $\frac{2n}{4}$ in value which is an integer

$\frac{2\left(30\right)}{4}=\frac{60}{4}=15, $there we are using

$\frac{n}{2}$ in & $\left(\frac{n}{2}+1\right)$ in both the formulas

$\frac{30}{2}=15$ in value & $\left(\frac{30}{2}+1\right)$ in equal 16 in value which lies both in the class

390.5 – 400.5 therefore

Q2 = $l+\frac{h}{f}\left(\frac{2n}{4}-c\right)$

$=390.5+\frac{10}{07}\left(\frac{2\left(30\right)}{4}-11\right)$

$=390.5+5.71$

$=396.21$

Now Q3 :-

 $\frac{3n}{4}$ in value $=3\left(\frac{30}{4}\right)=22.5$

 Which is not an integer

 Hence the 22nd value lies in the class 400.5 – 410.5

Q3 =$l+\frac{h}{f}\left(\frac{3n}{4}-7c\right) $

 $=400.5+\frac{10}{5}\left(3\left(\frac{30}{4}\right)-18\right)$

 $= 400.5+9$

$ =409.5$

Hence quartiles.

Q1 = 384.66 , Q2 = 396.21 & Q3 = 409.5

Q.3:

Ans.3: Standard deviation serves as a basic measure of variability a smaller value of the standard deviation indicates that most of the observation in a data set or closed to the mean while a large value employees that the observations are scattered widely about mean.

In case of two sets we measure effeciency of two sets by the co-efficient of variation. Where smaller value of co-efficient of variation idicates the more efficient set in the relation between mean and standard deviation.

Q.4:

Ans.4:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Class | Frequency of fi | $$x\_{i}$$ | fi xi | fi xi2 |
| 64 – 84 | 15 | 74.5 | 1117.5 | 83253.75 |
| 85 – 104 | 18 | 94.5 | 1701 | 160744.5 |
| 105 – 124 | 27 | 114.5 | 3091.5 | 353976.75 |
| 125 – 144 | 10 | 134.5 | 1345 | 180902.5 |
| 145 – 164 | 6 | 154.5 | 927 | 143221.5 |
| 165 – 184 | 5 | 174.5 | 872.5 | 152251.25 |
| 185 – 204 | 13 | 194.5 | 2528.5 | 491793.25 |
| Total | 94 |  | 11583 | 1566143.5 |

Variance:-

 $s^{2}=\frac{\sum\_{}^{}fx\_{i}^{2}}{\sum\_{}^{}f}-\left(\frac{\sum\_{}^{}fx}{\sum\_{}^{}f}\right)^{2}$

 $=\frac{1566143.5}{94}-\left(\frac{11583}{94}\right)^{2}$

 $=16661.101-15184.006$

 $=1477.095$

 Standard deviation

$s=\sqrt{\frac{\sum\_{}^{}fx^{2}}{\sum\_{}^{}f}-\left(\frac{\sum\_{}^{}fx\_{i}}{\sum\_{}^{}f}\right)^{2}}$

$=\sqrt{1477.095} =38.43$

Q.5:

Ans.5:

1. As the average gives equal weightage to all observation therefore as per the directives of the mean all the members can cross the river.
2. As the average gives equal weightage to all the students, as well as average effected by extreme values the result shows that may the data exist sum of the extreme values therefore every students as hopeless as passing marks are considered “33”.
3. The £ 20,000 shows that king and servants are equaly likely in income therefore this income provides equal facilites to king and its servants.

**THE END**