# RD Sharma 

 Solutions
## Class 11 Maths

$$
\begin{gathered}
\text { Chapter } 32 \\
\text { Ex } 32.5
\end{gathered}
$$

Statistics Ex 32.5 Q1

| $\times$ | $f$ | $f \times$ | $x$-mean | $(x \text {-mean })^{2}$ | $f(x \text {-mean })^{2}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 4.5 | 1 | 4.5 | -33.14 | 1098.45 | 1098.45 |
| 14.5 | 5 | 72.5 | -23.14 | 535.59 | 2677.96 |
| 24.5 | 12 | 294 | -13.14 | 172.73 | 2072.82 |
| 34.5 | 22 | 759 | -3.14 | 9.88 | 217.31 |
| 44.5 | 17 | 756.5 | 6.86 | 47.02 | 799.35 |
| 54.5 | 9 | 490.5 | 16.86 | 284.16 | 2557.47 |
| 64.5 | 4 | 258 | 26.86 | 721.31 | 2885.22 |
|  | $\mathrm{~N}=\mathbf{7 0}$ | 2635 |  |  | $\mathbf{1 2 3 0 8 . 5 7}$ |

Here, $\quad N=70, \quad \sum f_{j} x_{j}=2635$

$$
\bar{x}=\frac{1}{N}\left(\Sigma f_{j} x_{i}\right)=\frac{2635}{70}=37.64
$$

We have, $\sum f_{i}\left(x_{i}-\bar{x}\right)^{2}=12308.57$

$$
\begin{aligned}
& \operatorname{var}(x)=\frac{1}{N}\left[\Sigma f_{i}\left(x_{i}-\bar{x}\right)^{2}\right]=\frac{12308.57}{70}=175.84 \\
& S D .=\sqrt{\operatorname{var}(x)}=\sqrt{175.84}=13.26
\end{aligned}
$$

Statistics Ex 32.5 Q2

| X | F | Fx | x -mean | $\mathrm{F}(\mathrm{x}-$ <br> mean $)$ | $(x-\text { mean })^{2}$ | $F(x-\text { mean })^{2}$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 0 | 51 | 0 | -6 | -306 | 36 | 1836 |
| 1 | 203 | 203 | -5 | -1015 | 25 | 5075 |
| 2 | 383 | 766 | -4 | -1532 | 16 | 6128 |
| 3 | 525 | 1575 | -3 | -1575 | 9 | 4725 |
| 4 | 532 | 2128 | -2 | -1064 | 4 | 2128 |
| 5 | 408 | 2040 | -1 | -408 | 1 | 408 |
| 6 | 273 | 1638 | 0 | 0 | 0 | 0 |
| 7 | 139 | 973 | 1 | 139 | 1 | 139 |
| 8 | 43 | 344 | 2 | 86 | 4 | 172 |
| 9 | 27 | 243 | 3 | 81 | 9 | 243 |
| 10 | 10 | 100 | 4 | 40 | 16 | 160 |
| 11 | 4 | 44 | 5 | 20 | 25 | 100 |
| 12 | 2 | 24 | 6 | 12 | 36 | 72 |
|  | 2600 | 10078 |  | -5522 |  | 21186 |

Here, $\quad N=2600, \quad \Sigma f_{j} x_{j}=10078$

$$
\bar{x}=\frac{1}{N}\left(\Sigma f_{i} x_{i}\right)=\frac{10078}{2600}=3.88
$$

Since,

$$
\begin{aligned}
\operatorname{var}(x) & =h^{2}\left(\frac{1}{N} \sum f_{1}(x-\text { mean })^{2}-\left\{\frac{1}{N} \sum f_{1}(x-\text { mean })_{4}\right\}^{2}\right) \\
\sigma^{2} & =1\left(\frac{21186}{2600}-\left(\frac{-5522}{2600}\right)^{2}\right) \\
\sigma^{2} & =8.14846-4.51072 \\
\sigma^{2} & =5.64
\end{aligned}
$$

## Statistics Ex 32.5 Q3

i)

| $x_{i}$ | Cum Freq | $f_{i}$ | $f_{i} x_{i}$ | $f_{i} x_{i}^{2}$ |
| :---: | :---: | :---: | :---: | :---: |
| 10 | 15 | 15 | 150 | 1500 |
| 20 | 32 | 17 | 340 | 6800 |
| 30 | 51 | 19 | 570 | 17100 |
| 40 | 78 | 27 | 1080 | 43200 |
| 50 | 97 | 19 | 950 | 47500 |
| 60 | 109 | 12 | 720 | 43200 |
|  |  | $N=109$ | Total $=3810$ | Total $=159300$ |

Mean $=\frac{3810}{109}=34.95$
$V a r=\frac{159300}{109}-(34.95)^{2}=239.96$
$S D=\sqrt{239.96}=15.49$
ii)

| $x_{i}$ | $f_{i}$ | $f_{i} x_{i}$ | $f_{i} x_{i}{ }^{2}$ |
| :---: | :---: | :---: | :---: |
| 2 | 1 | 2 | 4 |
| 3 | 6 | 18 | 54 |
| 4 | 6 | 24 | 96 |
| 5 | 8 | 40 | 200 |
| 6 | 8 | 48 | 288 |
| 7 | 2 | 14 | 98 |
| 8 | 2 | 16 | 128 |
| 9 | 3 | 27 | 243 |
| 10 | 0 | 0 | 0 |
| 11 | 2 | 22 | 242 |
| 12 | 1 | 12 | 144 |
| 13 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 |
| 16 | 1 | 16 | 256 |

$$
N=40 \quad \text { Total }=239 \quad \text { Total }=1753
$$

Mean $=\frac{239}{40}=5.975$
$\operatorname{Var}=\frac{1753}{40}-(5.975)^{2}=8.12$
$S D=\sqrt{8.12}=2.85$

## Statistics Ex 32.5 Q4

(i)

| $x$ | $\mathbf{f}$ | $\mathbf{f x}$ | $x$-mean | $(x \text {-mean })^{\mathbf{2}}$ | $\mathbf{f ( x - m e a n ) ^ { \mathbf { 2 } }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | 7 | 21 | -9.79 | 95.88 | 671.13 |
| 8 | 10 | 80 | -4.79 | 22.96 | 229.60 |
| 13 | 15 | 195 | 0.21 | 0.04 | 0.65 |
| 18 | 10 | 180 | 5.21 | 27.13 | 271.26 |
| 23 | 6 | 138 | 10.21 | 104.21 | 625.26 |
|  | 48 | 614 |  |  | $\mathbf{1 7 9 7 . 9 2}$ |

Here, $N=48$, and $\Sigma f_{i} x_{i}=614$

$$
\bar{x}=\frac{1}{N}\left(\sum f_{i} X_{j}\right)=\frac{614}{48}=12.79
$$

$$
\Sigma f_{i}\left(x_{i}-\bar{x}\right)^{2}=1797.92
$$

$$
\operatorname{var}(x)=\frac{1}{N}\left[\sum f_{i}\left(x_{i}-\bar{x}\right)^{2}\right]=\frac{1797.92}{48}=37.46
$$

$$
S . D .=\sqrt{\operatorname{var}(x)}-\sqrt{37.46}=6.12
$$

ii)

| $x_{i}$ | $f_{i}$ | $f_{i} x_{i}^{2}$ |
| :---: | :---: | :---: |
| 2 | 4 | 16 |
| 3 | 9 | 81 |
| 4 | 16 | 256 |
| 5 | 14 | 350 |
| 6 | 11 | 396 |
| 7 | 6 | 294 |
|  | $N=60$ | Total $=1393$ |

Mean $=\frac{8+27+64+70+66+42}{60}=\frac{277}{60}=4.62$
$\operatorname{Var}=\frac{1393}{60}-(4.62)^{2}=1.88$
$S D=\sqrt{1.88}=1.37$

