Index

Unit – 1 ⇝ Descriptive Statistics

Method 2 ⇝ Measure of Central Tendency

Example of Method-2.1: Examples of Mean

A	1	Find mean of following data: (a) 2, 8, 4, 6, 10, 12, 4, 8, 14, 16 (b) 10, 9, 21, 16, 14, 18, 20, 18, 14, 18, 23, 16, 18, 4 **Answer: (a) 8.4, (b) 15.6429**
A	2	Find the mean for following data: Weight of students: 18, 22, 30, 35, 39, 42, 45, 47 Number of students: 4, 5, 8, 8, 16, 4, 2, 3 **Answer: 34.5**
A	3	Find the mean for following data: x: 10, 20, 36, 40, 50, 56, 60, 70, 72, 80, 88, 92, 95 f: 1, 1, 3, 4, 3, 2, 4, 4, 1, 1, 2, 3, 1 **Answer: 59.3**
B	4	Find the mean if survey regarding the weights (kg) of 45 students of class X of a school was conducted and the following data was obtained: x: 20 – 25, 25 – 30, 30 – 35, 35 – 40, 40 – 45, 45 – 50, 50 – 55 f: 2, 5, 8, 10, 7, 10, 3 **Answer: 38.83**

B	5	The following data represents the no. of foreign visitors in a multinational company in every 10 days during last 2 months. Use the data to find the mean. **Answer: 28**

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of visitors	12	18	27	20	17	06

C	6	Find the missing frequency from the following data if mean is 19.92. **Answer: 10**

Class	4 – 8	8 – 12	12 – 16	16 – 20	20 – 24
f	11	13	16	14	?

24 – 28	28 – 32	32 – 36	36 – 40
9	17	6	4

C	7	Find the mean of the following frequency distribution: **Answer: 27.8472**

Mid value	15	20	25	30	35	40	45	50	55
Frequency	2	22	19	14	3	4	6	1	1
Cumulative	2	24	43	57	60	64	70	71	72

Example of Method-2.2: Median

<table>
<tr><td>A</td><td>1</td><td>Find the median of following data:
(a) 6, 20, 43, 50, 19, 53, 0, 37, 78, 1, 15.
(b) 10, 34, 27, 24, 12, 27, 20, 18, 15, 30.
(c) 110, 115, 108, 112, 120, 116, 140, 135, 128, 132.

Answer: (a) 20, (b) 22, (c) 118</td></tr>
<tr><td>A</td><td>2</td><td>If the median of the data is 2, find the value of a: −9, −4, a, 5, 8, 11.

Answer: − 1</td></tr>
<tr><td>A</td><td>3</td><td>Obtain the median size of shoes sold from the following data:

<table>
<tr><td>Size</td><td>5</td><td>5.5</td><td>6</td><td>6.5</td><td>7</td><td>7.5</td><td>8</td></tr>
<tr><td>Pair</td><td>30</td><td>40</td><td>50</td><td>150</td><td>300</td><td>600</td><td>950</td></tr>
</table>
Answer: 7.5</td></tr>
<tr><td>C</td><td>4</td><td>Calculate the missing frequency from the following distribution, it is being given that the median of the distribution is 24.
<table>
<tr><td>Marks</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 – 50</td></tr>
<tr><td>No. of students</td><td>5</td><td>25</td><td>x</td><td>18</td><td>7</td></tr>
</table>
Answer: x = 25</td></tr>
<tr><td>C</td><td>5</td><td>The following table gives the marks obtained by 50 students in mathematics. Find the median.
<table>
<tr><td>x</td><td>10–14</td><td>15–19</td><td>20–24</td><td>25–29</td><td>30–34</td><td>35–39</td><td>40–44</td><td>45–49</td></tr>
<tr><td>f</td><td>4</td><td>6</td><td>10</td><td>5</td><td>7</td><td>3</td><td>9</td><td>6</td></tr>
</table>
Answer: 29.5</td></tr>
</table>

Example of Method-2.3: Mode

A | 1 Find the mode of following data:

x	1	2	3	4	5	6	7	8	9
f	8	10	11	16	20	25	15	9	6

Answer: 6

A | 2 Find the mode from the following frequency distribution:

x	8	9	10	11	12	13	14	15
f	5	6	8	7	9	8	9	6

Answer: 12 & 14

B | 3 Find the mode of following data:

Class	200 – 220	220 – 240	240 – 260	260 – 280
f	7	15	21	19

280 – 300	300 – 320	320 – 340
6	4	2

Answer: 255

B | 4 Find the mode of following data:

Class	400 – 500	500 – 600	600 – 700	700 – 800	800 – 900
f	8	16	20	17	3

Answer: 657.14

C | 5 The mode of the following data is 67. Find the missing frequency x.

Amount	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
Frequency	5	x	15	12	7

Answer: 8

B | 6 An insurance company obtained the following data for accident claims (in thousand rupees) from a particular region. Find its mean, median and mode.

Amount	1 – 3	3 – 5	5 – 7	7 – 9	9 – 11	11 – 13
Frequency	6	47	75	46	18	8

Answer: $\bar{x} = 6.47$, $M = 6.2533$, $Z = 5.9825$

C	7	Obtain the mean, median and mode for the following information: **Answer:** $\bar{x} = 17.6$, $M = 17.2222$, $Z = 16.6667$

Marks	0 <	10 <	20 <	30 <
Number of Students	50	38	20	5

Method 3 ⇝ Measure of Variability

Example of Method-3: Dispersion

A	1	Find the standard deviation for the following distribution: | x | 5 | 15 | 25 | 30 | | f | 2 | 1 | 1 | 3 | **Answer: 10.6104**
C	2	Find the standard deviation for the following distribution: | Class | 0 – 100 | 100 – 200 | 200 – 300 | 300 – 400 | | f | 6 | 10 | 18 | 20 | | | 400 – 500 | 500 – 600 | 600 – 700 | 700 – 800 | | | 15 | 12 | 10 | 9 | **Answer: 196.21**
C	3	Find the standard deviation and variance of the mark distribution of 30 students at mathematics examination in a class as below: | Class | 10 – 25 | 25 – 40 | 40 – 55 | 55 – 70 | 70 – 85 | 85 – 100 | | f | 2 | 3 | 0 | 14 | 8 | 3 | **Answer: $\sigma = 19.3391$, $V = 374.0008$**
B	4	Runs scored by two batsmen A, B in 9 consecutive matches is given below: | A | 85 | 20 | 62 | 28 | 74 | 5 | 69 | 4 | 13 | | B | 72 | 4 | 15 | 30 | 59 | 15 | 49 | 27 | 26 | Which of the batsman is more consistent? **Answer: Batsman B is more consistent.**
C	5	Goals scored by two team A and B in a football season were as shown in the table. Find out which team is more consistent. | Number of goals in a match | 0 | 1 | 2 | 3 | 4 | | Team A | 27 | 9 | 8 | 5 | 4 | | Team B | 17 | 9 | 6 | 5 | 3 | **Answer: Team B is more consistent.**

<table>
<tr>
<td>C</td>
<td>6</td>
<td>Lives of two models of refrigerators turned in for new models in a recent survey are given in the adjoining table.
<table>
<tr><td>Life (in year)</td><td>0 – 2</td><td>2 – 4</td><td>4 – 6</td><td>6 – 8</td><td>8 – 10</td><td>10 – 12</td></tr>
<tr><td>Model A</td><td>5</td><td>16</td><td>13</td><td>7</td><td>5</td><td>4</td></tr>
<tr><td>Model B</td><td>2</td><td>7</td><td>12</td><td>19</td><td>9</td><td>1</td></tr>
</table>
(1) What is the average life of each model of these refrigerators?
(2) Which model shows more uniformity?

Answer: (1) 5.12 & 6.16, (2) Model B</td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>Find the mean deviation about the mean, median and mode for the following data:
5, 10, 17, 20, 23, 20.

Answer: $MD(\bar{x}) = 5.5556$, $MD(M) = 5.1667$, $MD(Z) = 5$</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>Find mean deviation about the mean, median and mode for the following data:
<table>
<tr><td>x</td><td>2</td><td>5</td><td>6</td><td>8</td><td>10</td><td>12</td></tr>
<tr><td>f</td><td>2</td><td>8</td><td>10</td><td>7</td><td>8</td><td>5</td></tr>
</table>
Answer: $MD(\bar{x}) = MD(M) = MD(Z) = 2.3$</td>
</tr>
<tr>
<td>C</td>
<td>9</td>
<td>Find mean deviation about the mean, median and mode for the following data:
<table>
<tr><td>Class</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 – 50</td><td>50 – 60</td></tr>
<tr><td>f</td><td>5</td><td>10</td><td>20</td><td>9</td><td>6</td></tr>
</table>
Answer: $MD(\bar{x}) = 8.28$, $MD(M) = 8.20$, $MD(Z) = 8.30$</td>
</tr>
</table>

Method 4 ⇝ Moments

Example of Method-4: Moments

<table>
<tr><td>A</td><td>1</td><td>Find the first four moments about assumed mean 14, actual mean and zero for the data 11, 12, 14, 16, 20.

Answer: $\mu = 0,\quad 10.24,\quad 19.162,\quad 213.5872$
$\mu' = 0.6,\quad 10.6,\quad 37.8,\quad 281.8$
$v = 14.6,\quad 223.4,\quad 3579.8,\quad 57225.8$</td></tr>
<tr><td>B</td><td>2</td><td>Calculate the four moments about assumed mean 15, actual mean and zero for following distribution.
<table><tr><td>x</td><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td></tr><tr><td>f</td><td>6</td><td>10</td><td>14</td><td>6</td><td>4</td></tr></table>Answer: $\mu = 0,\quad 34,\quad 40.5,\quad 2707$
$\mu' = -1,\quad 35,\quad -62.5,\quad 2750$
$v = 14,\quad 230,\quad 4212.5,\quad 83375$</td></tr>
<tr><td>B</td><td>3</td><td>Calculate the moments about assumed mean 3, actual mean and zero for following distribution:
<table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>f</td><td>5</td><td>4</td><td>3</td><td>7</td><td>1</td><td>1</td></tr></table>Answer: $\mu = 0,\quad 2.0862,\quad 0.5017,\quad 9.0299$
$\mu' = -0.0952,\quad 2.0952,\quad -0.0952,\quad 8.9524$
$v = 2.9048,\quad 10.5238,\quad 43.1905,\quad 191.6667$</td></tr>
</table>

<table>
<tr>
<td>C</td>
<td>4</td>
<td>Calculate the moments about assumed mean 35, actual mean and zero for following distribution:
<table>
<tr><td>x</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 – 50</td><td>50 – 60</td><td>60 – 70</td></tr>
<tr><td>f</td><td>8</td><td>12</td><td>20</td><td>30</td><td>15</td><td>10</td><td>5</td></tr>
</table>
Answer: $\mu = 0, \quad 236.76, \quad 264.336, \quad 141290.0876$
$\mu' = -1.8, \quad 240, \quad -1020, \quad 144000$
$v = 33.2, \quad 1339, \quad 60440, \quad 2957125$</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>Calculate the moments about assumed mean 65, actual mean and zero for following distribution:
<table>
<tr><td>Class</td><td>60 – 62</td><td>63 – 65</td><td>66 – 68</td><td>69 – 71</td><td>72 – 74</td></tr>
<tr><td>f</td><td>5</td><td>18</td><td>42</td><td>27</td><td>8</td></tr>
</table>
Answer: $\mu = 0, \quad 8.5275, \quad -2.6933, \quad 199.3759$
$\mu' = 2.45, \quad 14.53, \quad 74.69, \quad 516.13$
$v = 67.45, \quad 4558.03, \quad 308586.79, \quad 20930221.03$</td>
</tr>
</table>

Method 5 ⇝ Measures of Skewness

Example of Method-5: Skewness

B	1	Find skewness by the method of moments for data: 38.2, 40.9, 39.5, 44, 39.6, 40.5, 39.5. **Answer: 1.3035**
B	2	Karl Pearson's coefficient of skewness of a distribution is 0.3, its variance is 8 and mean is 200. Find the mode and median for the distribution. **Answer: 195.2, 198.4**
B	3	From the marks scored by 120 students in section A and 120 students in section B of a class, the following measures were obtained Section A: $\mu_A = 46.83$, $\sigma_A = 14.8$, Mode = 51.67 Section A: $\mu_B = 47.83$, $\sigma_B = 14.8$, Mode = 47.07 Determine which distribution of marks is more skewed. **Answer: Section A is more skewed**
B	4	Find skewness of the following data using method of moment. x: 5, 10, 15, 20, 25, 30, 35 f: 8, 15, 20, 32, 23, 17, 5 **Answer: 0.01141**
C	5	Find Karl Pearson's coefficient of skewness and skewness based on the method of moments for the following data: Class: 0 – 10, 10 – 20, 20 – 30, 30 – 40, 40 – 50 f: 13, 20, 30, 25, 12 **Answer: -0.1135, 0.0085**

Method 6 ⇝ Kurtosis

Example of Method-6: Kurtosis

<table>
<tr><td>A</td><td>1</td><td>Find the Kurtosis for the data 1, 3, 7, 9, 10. Also comment on type of distribution.

Answer: Kurtosis = 1.45, Distribution is platykurtic</td></tr>
<tr><td>C</td><td>2</td><td>Find the kurtosis for the following data. Also, Comment on type of distribution.
<table>
<tr><td>Class</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td></tr>
<tr><td>f</td><td>1</td><td>3</td><td>4</td><td>2</td></tr>
</table>
Answer: Kurtosis = 2.2583, Distribution is platykurtic</td></tr>
<tr><td>C</td><td>3</td><td>Find out the kurtosis of the following data:
<table>
<tr><td>Class</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td></tr>
<tr><td>f</td><td>1</td><td>4</td><td>3</td><td>2</td></tr>
</table>
Answer: 2.102</td></tr>
<tr><td>C</td><td>4</td><td>Find the coefficient of variation, β_1 and β_2 for the following data:
<table>
<tr><td>x</td><td>170 – 180</td><td>180 – 190</td><td>190 – 200</td><td>200 – 210</td><td>210 – 220</td><td>220 – 230</td><td>230 – 240</td><td>240 – 250</td></tr>
<tr><td>f</td><td>52</td><td>68</td><td>85</td><td>92</td><td>100</td><td>95</td><td>70</td><td>28</td></tr>
</table>
Answer: C.V. = 9.4, $\beta_1 = 0.0034$, $\beta_2 = 2.0340$</td></tr>
</table>

*** * * * * End of the Unit * * * ***