

COURSE: VECTOR SPACES, SAMPLING THEORY & OPTIMIZATION
COURSE CODE: 21MAT31A
MODULE - 3: STATISTICS

Q. No.	Questions	Marks	COs	BLs																					
1	Calculate the mean of the following frequency distribution <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Class</td><td style="padding: 2px;">0 - 8</td><td style="padding: 2px;">8 - 16</td><td style="padding: 2px;">16 - 24</td><td style="padding: 2px;">24 - 32</td><td style="padding: 2px;">32 - 40</td><td style="padding: 2px;">40 - 48</td></tr> <tr> <td style="padding: 2px;">Frequency</td><td style="padding: 2px;">8</td><td style="padding: 2px;">7</td><td style="padding: 2px;">16</td><td style="padding: 2px;">24</td><td style="padding: 2px;">15</td><td style="padding: 2px;">7</td></tr> </table>	Class	0 - 8	8 - 16	16 - 24	24 - 32	32 - 40	40 - 48	Frequency	8	7	16	24	15	7	6	1	1							
Class	0 - 8	8 - 16	16 - 24	24 - 32	32 - 40	40 - 48																			
Frequency	8	7	16	24	15	7																			
2	For the two frequency distributions given below the mean calculated from the first was 25.4 and that the second was 32.5 find the value of the x and y . <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Class</td><td style="padding: 2px;">10 - 20</td><td style="padding: 2px;">20 - 30</td><td style="padding: 2px;">30 - 40</td><td style="padding: 2px;">40 - 50</td><td style="padding: 2px;">50 - 60</td></tr> <tr> <td style="padding: 2px;">Frequency - 1</td><td style="padding: 2px;">20</td><td style="padding: 2px;">15</td><td style="padding: 2px;">10</td><td style="padding: 2px;">x</td><td style="padding: 2px;">y</td></tr> <tr> <td style="padding: 2px;">Frequency - 2</td><td style="padding: 2px;">4</td><td style="padding: 2px;">8</td><td style="padding: 2px;">4</td><td style="padding: 2px;">$2x$</td><td style="padding: 2px;">y</td></tr> </table>	Class	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Frequency - 1	20	15	10	x	y	Frequency - 2	4	8	4	$2x$	y	7	1	1			
Class	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60																				
Frequency - 1	20	15	10	x	y																				
Frequency - 2	4	8	4	$2x$	y																				
3	Find the median of the following <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Class</td><td style="padding: 2px;">20 - 30</td><td style="padding: 2px;">30 - 40</td><td style="padding: 2px;">40 - 50</td><td style="padding: 2px;">50 - 60</td><td style="padding: 2px;">60 - 70</td></tr> <tr> <td style="padding: 2px;">Frequency</td><td style="padding: 2px;">3</td><td style="padding: 2px;">5</td><td style="padding: 2px;">20</td><td style="padding: 2px;">10</td><td style="padding: 2px;">5</td></tr> </table>	Class	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	Frequency	3	5	20	10	5	6	2	2									
Class	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70																				
Frequency	3	5	20	10	5																				
4	A number of particular articles has been classified according to their weight. After drying for two week the same articles have again be weighted and similarly classified. It is known that the median weight in the first weight was 20.83 while in the second weighting it was 17.35. Some frequencies a and b in the first weighting and x and y in the second are missing. It is given that $a = \frac{x}{3}$ and $b = \frac{y}{2}$. Find out the missing frequencies. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Class</td><td style="padding: 2px;">0 - 5</td><td style="padding: 2px;">5 - 10</td><td style="padding: 2px;">10 - 15</td><td style="padding: 2px;">15 - 20</td><td style="padding: 2px;">20 - 25</td><td style="padding: 2px;">25 - 30</td></tr> <tr> <td style="padding: 2px;">Frequency - 1</td><td style="padding: 2px;">a</td><td style="padding: 2px;">b</td><td style="padding: 2px;">11</td><td style="padding: 2px;">52</td><td style="padding: 2px;">75</td><td style="padding: 2px;">22</td></tr> <tr> <td style="padding: 2px;">Frequency - 2</td><td style="padding: 2px;">x</td><td style="padding: 2px;">y</td><td style="padding: 2px;">40</td><td style="padding: 2px;">50</td><td style="padding: 2px;">30</td><td style="padding: 2px;">28</td></tr> </table>	Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	Frequency - 1	a	b	11	52	75	22	Frequency - 2	x	y	40	50	30	28	7	2	2
Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30																			
Frequency - 1	a	b	11	52	75	22																			
Frequency - 2	x	y	40	50	30	28																			
5	The median and mode are given to be Rs. 25 and Rs. 24 respectively. Calculate the missing frequency. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Class</td><td style="padding: 2px;">0 - 10</td><td style="padding: 2px;">10 - 20</td><td style="padding: 2px;">20 - 30</td><td style="padding: 2px;">30 - 40</td><td style="padding: 2px;">40 - 50</td></tr> <tr> <td style="padding: 2px;">Frequency</td><td style="padding: 2px;">14</td><td style="padding: 2px;">x</td><td style="padding: 2px;">27</td><td style="padding: 2px;">y</td><td style="padding: 2px;">15</td></tr> </table>	Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	Frequency	14	x	27	y	15	7	2	2									
Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50																				
Frequency	14	x	27	y	15																				
6	The median and mode of the following wages are known to be Rs. 33.5 and Rs. 34 respectively. Find the value of x, y and z . Given total frequency is 230. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Class</td><td style="padding: 2px;">0 - 10</td><td style="padding: 2px;">10 - 20</td><td style="padding: 2px;">20 - 30</td><td style="padding: 2px;">30 - 40</td><td style="padding: 2px;">40 - 50</td><td style="padding: 2px;">50 - 60</td><td style="padding: 2px;">60 - 70</td></tr> <tr> <td style="padding: 2px;">Frequency</td><td style="padding: 2px;">4</td><td style="padding: 2px;">16</td><td style="padding: 2px;">x</td><td style="padding: 2px;">y</td><td style="padding: 2px;">z</td><td style="padding: 2px;">6</td><td style="padding: 2px;">4</td></tr> </table>	Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	Frequency	4	16	x	y	z	6	4	7	2	2					
Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70																		
Frequency	4	16	x	y	z	6	4																		
7	For a group of 200 candidates, the mean and standard deviation of scores were found to be 40 and 15 respectively. Later on it was discovered the score 43 and 35 was misread as 34 and 53 respectively. Find the corrected standard deviation corresponding to the corrected figures.	7	3	3																					

8	<p>The scores obtained by two batsmen A and B in 10 matches are given below. Calculating mean, SD and coefficient of variation for each batsman, determine who is more efficient and who is more consistent.</p> <table border="1" data-bbox="311 228 1148 308"> <tr> <td>A</td><td>30</td><td>44</td><td>66</td><td>62</td><td>60</td><td>34</td><td>80</td><td>46</td><td>20</td><td>38</td></tr> <tr> <td>B</td><td>34</td><td>46</td><td>70</td><td>38</td><td>55</td><td>48</td><td>60</td><td>34</td><td>45</td><td>30</td></tr> </table>	A	30	44	66	62	60	34	80	46	20	38	B	34	46	70	38	55	48	60	34	45	30	7	3	3
A	30	44	66	62	60	34	80	46	20	38																
B	34	46	70	38	55	48	60	34	45	30																
9	<p>Compute the first four moments of the following distribution about the mean</p> <table border="1" data-bbox="287 418 1176 498"> <tr> <td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr> <tr> <td>f</td><td>1</td><td>8</td><td>28</td><td>56</td><td>70</td><td>56</td><td>28</td><td>8</td><td>1</td></tr> </table>	x	0	1	2	3	4	5	6	7	8	f	1	8	28	56	70	56	28	8	1	6	4	4		
x	0	1	2	3	4	5	6	7	8																	
f	1	8	28	56	70	56	28	8	1																	
10	<p>Compute the Karl Pearson's measures of skewness for the following data</p> <table border="1" data-bbox="442 593 1021 673"> <tr> <td>x</td><td>58</td><td>59</td><td>60</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td></tr> <tr> <td>y</td><td>10</td><td>18</td><td>30</td><td>42</td><td>35</td><td>28</td><td>16</td><td>8</td></tr> </table>	x	58	59	60	61	62	63	64	65	y	10	18	30	42	35	28	16	8	6	4	4				
x	58	59	60	61	62	63	64	65																		
y	10	18	30	42	35	28	16	8																		
11	<p>For a distribution, Bowley's coefficient of skewness is 0.6. The sum of upper and lower quartiles is 100 and median is 38. Compute the upper and lower quartiles.</p>	6	4	4																						
12	<p>The first four moments of a distribution about the value 4 of the variable are -1.5, 17, -30 and 108. Test whether the distribution is platykurtic or leptokurtic.</p>	6	4	4																						
13	<p>Establish the formula $r = \frac{\sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2}{2 \sigma_x \sigma_y}$</p>	6	3	3																						
14	<p>Find the correlation co-efficient between x and y from the given data:</p> <table border="1" data-bbox="352 1199 1103 1279"> <tr> <td>x</td><td>78</td><td>89</td><td>97</td><td>69</td><td>59</td><td>79</td><td>68</td><td>57</td></tr> <tr> <td>y</td><td>125</td><td>137</td><td>156</td><td>112</td><td>107</td><td>138</td><td>123</td><td>108</td></tr> </table>	x	78	89	97	69	59	79	68	57	y	125	137	156	112	107	138	123	108	6	3	3				
x	78	89	97	69	59	79	68	57																		
y	125	137	156	112	107	138	123	108																		
15	<p>Obtain the regression lines of y on x and x on y for the following data:</p> <table border="1" data-bbox="532 1374 931 1455"> <tr> <td>x</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td></tr> <tr> <td>y</td><td>5</td><td>7</td><td>9</td><td>8</td><td>11</td></tr> </table>	x	2	4	6	8	10	y	5	7	9	8	11	7	4	4										
x	2	4	6	8	10																					
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16	<p>Obtain the regression lines of y on x and x on y for the following data:</p> <table border="1" data-bbox="471 1558 988 1638"> <tr> <td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr> <td>y</td><td>2</td><td>5</td><td>3</td><td>8</td><td>7</td></tr> </table>	x	1	2	3	4	5	y	2	5	3	8	7	7	4	4										
x	1	2	3	4	5																					
y	2	5	3	8	7																					
17	<p>The following results were obtained from records of age(x) and blood pressure (y) of a group of 10 men, given $\Sigma(x - \bar{x})(y - \bar{y}) = 1220$. Find the appropriate regression equation and use it to estimate the blood pressure of a man whose age is 45</p> <table border="1" data-bbox="512 1839 944 1959"> <tr> <td></td><td>x</td><td>y</td></tr> <tr> <td>Mean</td><td>53</td><td>142</td></tr> <tr> <td>Variance</td><td>130</td><td>165</td></tr> </table>		x	y	Mean	53	142	Variance	130	165	7	4	4													
	x	y																								
Mean	53	142																								
Variance	130	165																								

18	In a partially destroyed laboratory record of correlation data, the following result only are available, variance of x is 9, regression equation y on x and x on y are $4x - 5y + 33 = 0$, $20x - 9y - 107 = 0$ respectively. Calculate the coefficient of correlation, \bar{x} , \bar{y} and σ_y	7	3	3
19	If θ is the acute angle between the two regression lines relating the variables x and y , show that $\tan \theta = \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \left(\frac{1-r^2}{r} \right)$	6	5	5
20	Find the co-efficient of correlation between x and y given $2\sigma_x = \sigma_y$ and the angle between the lines of regression is $\tan^{-1} \left(\frac{3}{5} \right)$	6	5	5