

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

B.Tech-V Semester (CSE/IT/BI/BT)

COURSE CODE (CREDITS): 20B1WCI531 (02)

MAX. MARKS: 25

COURSE NAME: Foundation of Data Science and Visualization

COURSE INSTRUCTORS: RBT, RKI

MAX. TIME: 1 Hour 30 Minutes

*Note: (a) All questions are compulsory.*

*(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

Q. No	Question	CO	Marks																								
Q1	<p>a) The possible values of the correlation coefficient lies between _____ and _____.</p> <p>b) If <math>f(x) = 12x^4 - 2x^3 + 9x^2 + 5</math>, then the first order necessary condition for either maxima or minima of <math>f(x)</math> is _____</p> <p>c) The restrictions on the possible values of the solution to the optimization problem are called _____.</p> <p>d) Correlation between number of customers and sales (in rupees) is 0.8. Does the correlation change if the sale is measured in thousand of rupees?</p> <p>e) Coefficient of correlation between X and Y is 0.3. Their covariance is 9. The variance of X is 16. Find the standard deviation of Y series is _____.</p>	CO1	1 * 5																								
Q2	<p>a) Explain weighted least square method with an example. OR Explain gradient descent in detail.</p> <p>b) The net profit is about 10% of the sales. The scatter plot between sales and profit can be thought of as a line (True/ False).</p>	CO5	4+ 1																								
Q3	<p>a) A college professor believes that if the grade for internal examination is high in a class, the grade for external examination will also be high. A random sample of 10 students in that class was selected, and the data is given below. Fit a linear curve to the data.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Internal Exam</th> <th>External Exam</th> <th>Internal Exam</th> <th>External Exam</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>49</td> <td>16</td> <td>52</td> </tr> <tr> <td>18</td> <td>58</td> <td>24</td> <td>62</td> </tr> <tr> <td>24</td> <td>58</td> <td>11</td> <td>30</td> </tr> <tr> <td>22</td> <td>60</td> <td>24</td> <td>59</td> </tr> <tr> <td>19</td> <td>63</td> <td>16</td> <td>49</td> </tr> </tbody> </table> <p>OR Explain polynomial regression in detail.</p>	Internal Exam	External Exam	Internal Exam	External Exam	15	49	16	52	18	58	24	62	24	58	11	30	22	60	24	59	19	63	16	49	CO5	3 + 2
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	b) List the assumptions in the regression analysis.																																														
Q4	<p>a) A certain injection is administered to each of the 12 patients resulted in the following increase of blood pressure: 5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4. Can it be concluded that the injection will be, in general, accompanied by an increase in blood pressure?( Test at 5 % LOS. <math>t_{0.05}</math> for one-tailed test for <math>(v = 11) = t_{0.10}</math> for two-tailed test for <math>(v = 11) = 1.80</math> ).</p> <p>b) Experienced flight instructors have claimed that praise for an exceptionally fine landing is typically followed by a poorer landing on the next attempt, whereas criticism of a faulty landing is typically followed by an improved landing. Should we thus conclude that verbal praise tends to lower performance levels, whereas verbal criticism tends to raise them? Or is some other explanation possible?</p>	CO4	3 + 2																																												
Q5	<p>a) A sample of 100 bulbs of brand A gave a mean lifetime of 1200 h, with an SD of 70 h, while another sample of 120 bulb of brand B gave a mean lifetime of 1150 h , with a SD of 85 h. Can we conclude that brand A bulbs are superior to brand B? (Test at 5 % LOS).</p> <p>The critical values for some standard LOS are given in the following table both for Two-tailed and one-tailed tests.</p> <table border="1"> <thead> <tr> <th rowspan="2">Nature of test</th> <th colspan="4">LOS</th> </tr> <tr> <th>1% ( 0.01)</th> <th>2% ( 0.02)</th> <th>5% ( 0.05)</th> <th>10% ( 0.1)</th> </tr> </thead> <tbody> <tr> <td>Two-tailed</td> <td><math> z\alpha  = 2.58</math></td> <td><math> z\alpha  = 2.33</math></td> <td><math> z\alpha  = 1.96</math></td> <td><math> z\alpha  = 1.645</math></td> </tr> <tr> <td>Right-tailed</td> <td><math>z\alpha = 2.33</math></td> <td><math>z\alpha = 2.055</math></td> <td><math>z\alpha = 1.645</math></td> <td><math>z\alpha = 1.28</math></td> </tr> <tr> <td>Left-tailed</td> <td><math>z\alpha = -2.33</math></td> <td><math>z\alpha = -2.055</math></td> <td><math>z\alpha = -1.645</math></td> <td><math>z\alpha = -1.28</math></td> </tr> </tbody> </table> <p>b) A public health official claims that the mean home water use is 350 gallons a day. To verify this claim, a study of 20 randomly selected homes was instigated with the result that the average daily water uses of these 20 homes were as follows. Do the data contradict the official's claim? ( <math>t_{0.05,19} = 1.730</math> )</p> <table border="1"> <tbody> <tr> <td>340</td> <td>344</td> <td>362</td> <td>375</td> </tr> <tr> <td>356</td> <td>386</td> <td>354</td> <td>364</td> </tr> <tr> <td>332</td> <td>402</td> <td>340</td> <td>355</td> </tr> <tr> <td>362</td> <td>322</td> <td>372</td> <td>324</td> </tr> <tr> <td>318</td> <td>360</td> <td>338</td> <td>370</td> </tr> </tbody> </table>	Nature of test	LOS				1% ( 0.01)	2% ( 0.02)	5% ( 0.05)	10% ( 0.1)	Two-tailed	$ z\alpha  = 2.58$	$ z\alpha  = 2.33$	$ z\alpha  = 1.96$	$ z\alpha  = 1.645$	Right-tailed	$z\alpha = 2.33$	$z\alpha = 2.055$	$z\alpha = 1.645$	$z\alpha = 1.28$	Left-tailed	$z\alpha = -2.33$	$z\alpha = -2.055$	$z\alpha = -1.645$	$z\alpha = -1.28$	340	344	362	375	356	386	354	364	332	402	340	355	362	322	372	324	318	360	338	370	CO4	2.5 + 2.5
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