JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2 EXAMINATION 2022

B.Tech-V Semester (CS/IT)

COURSE CODE (CREDITS): 20B1WCI531 (2) MAX. MARKS: 25

COURSE NAME: FOUNDATION FOR DATA SCIENCE AND VISUALIZATION

COURSE INSTRUCTORS: Ravindara Bhatt and Prateek Thakral MAX. TIME: 1 Hr 30 Min

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

1.

a. The functional form of Multiple Linear Regression is ______ **[1 Mark] [CO6]**.

b. Suppose we want to find the best fitting function y = f(x) where $y = w^2 x + w x$. How can we use linear regression to find the best value of w? **[2 Marks] [CO6]**

c. What assumptions are required for linear regression? What if some of these assumptions are violated? [**2 Marks**] [**CO6**]

2.

a. Draw and explain the flowchart for regression process.**[3 Marks] [CO6]**

b. Compare and contrast each dataset of eleven (x, y) points shown in Figure A [**2 Marks**] [**CO4**].

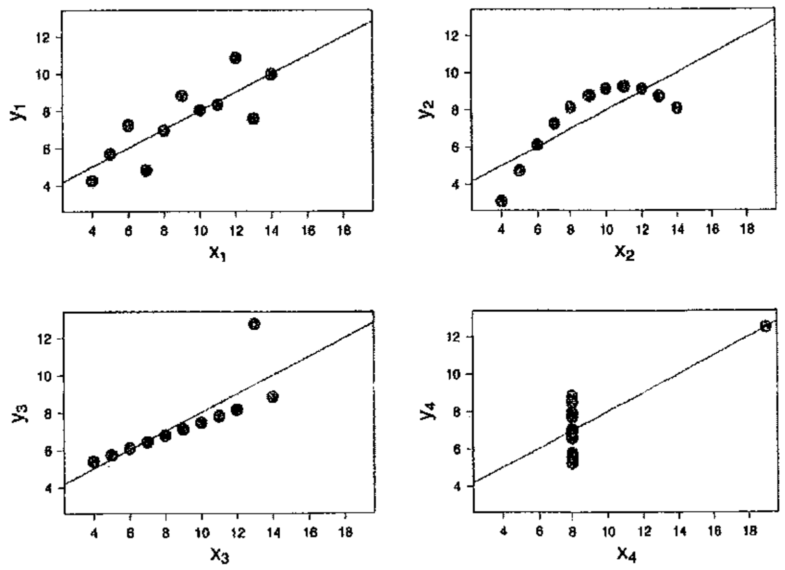

Figure A: Scatter plot of four different datasets

3.

a. Suppose that matrix A has an eigenvector v with eigenvalue λ. Show that v is also an eigenvector for A^2, and find the corresponding eigenvalue. How about for A^k, for $2 \leq k \leq n$? **[2 Marks] [CO 6]**

b. Consider the following matrix A. Compute eigenvalues, and eigenvectors corresponding to each eigenvalues for matrix A. [**3 Marks**] **[CO6]**

$$A = \begin{bmatrix} 0.36 & 0.48 & 0 \\ 0.48 & 0.64 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

4.

a. Show that v= (a, b) and **w** = (-b, a) are orthogonal vectors. **[2 Marks] [CO6]**

b. Describe the solution set for the following linear system. **[3 Marks][CO6]**

$$\begin{aligned} x_1 + 2x_2 + 3x_3 &= 5 \\ 2x_1 + 5x_2 + 3x_3 &= 3 \\ x_1 \qquad\quad + 8x_3 &= 17 \end{aligned}$$

5.

a. In general, how would you screen for outliers, and what should you do if you find one?**[1 Mark][CO 3]**

b. We often say that correlation does not imply causation. What does this mean? [**1 Marks][CO 5]**.

c. Solve the optimization problem that will result in a solution for x. **[3 Marks] [CO6]**

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x1 \\ x2 \\ x3 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$