MLF

Section Id :	64065359328
Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	11
Number of Questions to be attempted :	11
Section Marks :	40
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653123476
Question Shuffling Allowed :	No

Question Number : 50 Question Id : 640653827505 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MACHINE LEARNING FOUNDATIONS (COMPUTER BASED EXAM)"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?
CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406532781316. ✔ YES

6406532781317. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	640653123477
Question Shuffling Allowed :	No

Question Id : 640653827506 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (51 to 52)

Question Label : Comprehension

Let $A = \begin{pmatrix} 2 & 1 & 1 \\ a & 3 & 2 \\ 3 & b & c \end{pmatrix}$ be a 3×3 matrix. Let α be the eigenvalue corresponding to the eigenvector $v_1 = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$ and β is the eigenvalue corresponding to the eigenvector $v_2 = \begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix}$ of matrix A. Based on this information, answer the given sub-questions.

Sub questions

Question Number : 51 Question Id : 640653827507 Question Type : SA
Correct Marks : 3

Question Label : Short Answer Question

Find the value of $\alpha + 2\beta$.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :

3

Question Number : 52 Question Id : 640653827508 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options is/are true ?

Options :

6406532781319. ✔ Eigenvectors, v_1 and v_2 are linearly independent.

6406532781320. ✖ Eigenvectors, v_1 and v_2 are orthogonal.

6406532781321. ✔ A third eigenvector of A is $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

6406532781322. ✔ $a+b+c=9$.

Question Id : 640653827509 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Question Numbers : (53 to 54)

Question Label : Comprehension

Let $A=\begin{pmatrix}0&1&1\\1&0&1\\1&1&0\end{pmatrix}$ be a 3×3 matrix. Use this information to answer the given subquestions

Sub questions

Question Number : 53 Question Id : 640653827510 Question Type : MSQ Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options is/are true?

Options :

6406532781323. ✔ *A* is a symmetric matrix.

6406532781324. ✖ *A* is a diagonal matrix.

6406532781325. ✔ *A* is orthogonally diagonalizable.

6406532781326. ✔ Eigenvalues of *A* are -1, -1 and 2.

Question Number : 54 Question Id : 640653827511 Question Type : MSQ Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let v_1 and v_2 are the eigenvectors of A corresponding to distinct eigen-values.

We construct a new matrix B using these eigenvectors as its columns, such that $B=[v_1,v_2]$. Based on this information, which of the following options are correct?

Options :

6406532781327. ✔ Null space of the matrix B is zero space.

6406532781328. ✖ Column space of the matrix B is $\mathbb{R}^3$.

6406532781329. ✔

Column space of the matrix B represents a plane in $\mathbb{R}^3$.

Null space of the matrix B represents a line in $\mathbb{R}^3$.

6406532781330. ✖

Sub-Section Number : 3
Sub-Section Id : 640653123478
Question Shuffling Allowed : Yes

Question Number : 55 Question Id : 640653827512 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0
Question Label : Multiple Select Question

Let P be the projection matrix for a vector $a = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$. Which of the following options is/are true?

Options :

6406532781331. ✔ P is orthogonally diagonalizable.

6406532781332. ✔ $P^4 = P$.

6406532781333. ✔ Projection of $b = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$ on the vector a is $-\frac{1}{5}a$.

6406532781334. ✖ $Rank(P) = 2$

Sub-Section Number : 4
Sub-Section Id : 640653123479
Question Shuffling Allowed : Yes

Question Number : 56 Question Id : 640653827513 Question Type : MCQ
Correct Marks : 4
Question Label : Multiple Choice Question

Find the best-fit line for the dataset given below using the least squares method.

x	0	2	3	5
y	1	2	4	3

Options :

6406532781335. ✔ $\hat{y} = 1.34 + 0.46x$

6406532781336. ✖ $\hat{y} = 0.46 + 1.34x$

6406532781337. ✖ $\hat{y} = 1.34 - 0.46x$

6406532781338. ✖ $\hat{y} = 2.16 + 0.74x$

Question Number : 57 Question Id : 640653827514 Question Type : MCQ
Correct Marks : 4
Question Label : Multiple Choice Question

The function

$$f(x) = \begin{cases} ax^2 + bx + 1, & \text{if } x < 0 \\ cx + d, & \text{if } x \geq 0 \end{cases}$$

is differentiable at $(x = 0)$. If a, b, c, and d are constants, which of the following must be true?

Options :

6406532781339. ✖ $a = c$ and $b = 1$

6406532781340. ✔ $b = c$ and $d = 1$

6406532781341. ✖ $a = c$ and $d = 1$

6406532781342. ✖ $b = d = 1$

Sub-Section Number : 5
Sub-Section Id : 640653123480
Question Shuffling Allowed : Yes

Question Number : 58 Question Id : 640653827515 Question Type : MCQ
Correct Marks : 3
Question Label : Multiple Choice Question
Which of the following statements is true for a function f(x, y) that is differentiable at a point (a, b)?
Options :

6406532781343. ✔ The directional derivative exists in every direction.

6406532781344. ✖ The directional derivative is the same in every direction.

6406532781345. ✖ The directional derivative can only be calculated along the axes.

6406532781346. ✖ The directional derivative does not exist.

Question Number : 59 Question Id : 640653827516 Question Type : MCQ
Correct Marks : 3
Question Label : Multiple Choice Question
Which of the following functions cannot be approximated linearly around $x = 0$?
Options :

6406532781347. ✖ $f(x) = \sin(x)$

6406532781348. ✖ $f(x) = \cos(x)$

6406532781349. ✔ $f(x) = \ln(x)$

6406532781350. ✖ $f(x) = x^2$

Sub-Section Number :	6
Sub-Section Id :	640653123481
Question Shuffling Allowed :	Yes

Question Number : 60 Question Id : 640653827517 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

If $f(x, y) = x^2y + 3xy^2$, what is the length of the gradient at the point (1,2)?
Enter the answer correct to two decimal places.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
20.58 to 20.64

Question Number : 61 Question Id : 640653827518 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

In a sports analytics company, the team is interested in predicting whether a basketball player will score above 20 points in a game using classification models. They collected data on various factors $x = [x_1, x_2, x_3]$ from past games of different players. The factors include minutes played, shots attempted, and free throw percentage. The data and corresponding labels are shown in the table below: Compute the misclassification

x	y
[1, 5, 0.8]	1
[0, 3, 0.9]	0
[1, 2, 0.7]	0
[1, 8, 0.6]	1
[0, 7, 0.5]	0

rate if they use the following step function:

$$u(z) = \begin{cases} 1, & \text{if } z \geq 3 \\ 0, & \text{otherwise} \end{cases}$$

and the linear combination z is given by: $0.6x_1 + 0.3x_2 + 0.1x_3$. Enter the answer correct to one decimal place.

Note: Here, x_1 represents whether the player is a starter (1) or not (0), x_2 is the number of shots attempted, and x_3 is the free throw percentage. The label y indicates whether the player scored more than 20 points (1) or not (0). The misclassification rate is the number of labels misclassified.e.g. if 3 out of 5 players are mislabeled then the misclassification rate is 3/5.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0.2

Sub-Section Number : 7
Sub-Section Id : 640653123482
Question Shuffling Allowed : Yes

Question Number : 62 Question Id : 640653827519 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question
Consider a dataset from an e-commerce company such as Flipkart that has details of customer behavior, which of the following problems can be best approached using clustering?
Options :
6406532781353. ✖ Predicting the exact number of sales for each customer segment.