```
public String toString() {
    return "Person: " + name + ", Address: " + addr;
}
```

6406535115671. ✔

```
public String toString() {
    return "Person: " + name + ", Address: " + addr.city
                              + ", " + addr.country;
}
```

6406535115672. ✖

```
public String toString() {
    return "Person: " + name + ", Address: " + addr.toString();
}
```

6406535115673. ✔

MLF

Section Id :	640653106045
Section Number :	7
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	12
Number of Questions to be attempted :	12
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 :	640653244921
Question Shuffling Allowed :	No

Question Number : 110 Question Id : 6406531527839 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 :

6406535115674. ✔ YES

6406535115675. ✖ NO

Sub-Section Number : 2

Sub-Section Id : 640653244922

Question Shuffling Allowed : Yes

Question Number : 111 Question Id : 6406531527840 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A bank wants to decide whether a loan applicant should be given a loan or not, based on features like income, credit score and past records. Which of the following machine learning techniques is applicable for this scenario?

Options :

6406535115676. ✖ Regression

6406535115677. ✔ Classification

6406535115678. ✖ Clustering

6406535115679. ✖ Dimensionality Reduction

Sub-Section Number : 3

Sub-Section Id : 640653244923

Question Shuffling Allowed : Yes

Question Number : 112 Question Id : 6406531527841 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the dataset $(x, y) : (-1, 2), (0, 1), (1, 2)$. Perform polynomial regression of degree 2 by fitting a quadratic model of the form $y = \theta_0 + \theta_1 x + \theta_2 x^2$. Using the method of least squares, find the estimates of θ_0, θ_1 and θ_2.

Options :

6406535115680. ✔ $y = x^2 + 1$

6406535115681. ✖ $y = x^2$

6406535115682. ✖ $y = x^2 - 1$

6406535115683. ✖ $y = 2x$

Sub-Section Number : 4
Sub-Section Id : 640653244924
Question Shuffling Allowed : Yes

Question Number : 113 Question Id : 6406531527842 Question Type : MSQ
Correct Marks : 2 Max. Selectable Options : 0
Question Label : Multiple Select Question

Two vectors v_1 and v_2 are such that $v_1 = (1, 2, 2)^T$ and $v_2 = (2, -1, 0)^T$. Which of the following options is/are correct?

Options :

6406535115684. ✖ Vectors v_1 and v_2 are parallel to each other.

6406535115685. ✔ Vectors v_1 and v_2 are orthogonal to each other.

6406535115686. ✔ Projection of v_1 onto v_2 is the zero vector.

6406535115687. ✔ Projection of v_2 onto v_1 is the zero vector.

Sub-Section Number : 5
Sub-Section Id : 640653244925
Question Shuffling Allowed : Yes

Question Number : 114 Question Id : 6406531527843 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

Consider the following dataset where each data point consists of three features x_1, x_2 and x_3 as

$$(2, 4, 3), (5, 5, 6), (2, 2, 1), (4, 4, 6)$$

Suppose the encoder and decoder functions, f and g respectively, are defined as

$$f(x_1, x_2, x_3) = 0.5x_1 + 0.5x_2 - x_3 \quad \text{and} \quad g(u) = [u, u, u].$$

Find the reconstruction loss.
Hint : "The reconstruction loss of the encoder decoder pair is the mean of the squared distance between the actual input and reconstructed input."

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal

Text Areas : PlainText
Possible Answers :
72

Question Number : 115 Question Id : 6406531527844 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

Does there exist a matrix A of shape 10×10 such that every non-zero vector in $\mathbb{R}^{10}$ is an eigenvector of A with eigenvalue 2? If yes, compute the value of $\det(A)$. If not, enter -1 as the answer.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1024

Sub-Section Number :	6
Sub-Section Id :	640653244926
Question Shuffling Allowed :	Yes

Question Number : 116 Question Id : 6406531527845 Question Type : SA
Correct Marks : 2
Question Label : Short Answer Question

If the sum of the columns of a square matrix A is equal to the zero vector, then λ is certainly an eigenvalue of A. What is the value of λ?

Note that the term "column" here refers to a column vector, that is, each column of A is treated as a vector.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0

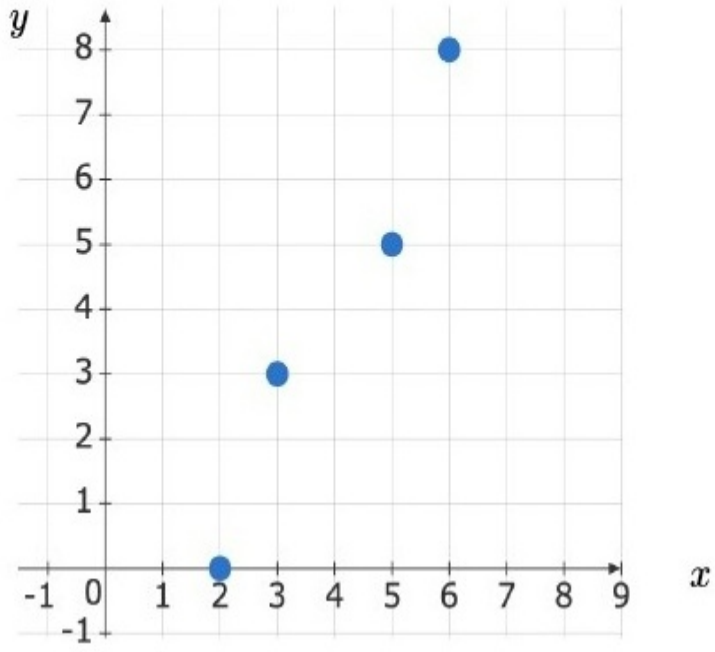
Sub-Section Number :	7
Sub-Section Id :	640653244927
Question Shuffling Allowed :	No

Question Id : 6406531527846 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Question Numbers : (117 to 118)

Question Label : Comprehension

Consider a regression problem that has 4 points in its training dataset as displayed below. The graph is drawn to scale.



Based on the above data, answer the given subquestions.

Sub questions

Question Number : 117 Question Id : 6406531527847 Question Type : MCQ Correct Marks : 3

Question Label : Multiple Choice Question

Which of these models has the smallest squared loss on this training dataset?

Options :

6406535115691. ✔ $f(x) = 2x - 4$

6406535115692. ✖ $f(x) = 4$

6406535115693. ✖ $f(x) = 8$

6406535115694. ✖ $f(x) = 4 - 2x$

Question Number : 118 Question Id : 6406531527848 Question Type : MCQ Correct Marks : 2

Question Label : Multiple Choice Question

Is there a model of the form $f(x) = wx + b$, with $w, b \in \mathbb{R}$ such that the squared loss is exactly zero on this training dataset?

Options :

6406535115695. ✔ No

6406535115696. ✖ Yes

6406535115697. ✖ Insufficient information to answer the question

Question Id : 6406531527853 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (119 to 120)

Question Label : Comprehension

Consider the following matrix

$$A = \begin{bmatrix} 1 & 0 & 2 \\ 3 & 1 & 5 \\ 2 & -1 & 1 \end{bmatrix}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 119 Question Id : 6406531527854 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Which of the following sets forms a basis for the row space of *A*?

Options :

6406535115705. ✖ {(1, 0, 2), (0, 1,−1)}

6406535115706. ✔ {(1, 0, 2), (0, 1,−1), (0, 0,−1)}

6406535115707. ✖ {(1, 0, 2), (0,−1, 1), (0,−1,−4)}

6406535115708. ✖ {(0, 1,−1), (0, 0,−4)}

Question Number : 120 Question Id : 6406531527855 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following linear relations is valid among the rows (R_1, R_2, R_3) of matrix A?

Options :

6406535115709. ✖ $R_2 - R_1 - R_3 = 0$

6406535115710. ✖ $R_1 + R_2 - 2R_3 = 0$

6406535115711. ✔ $0.R_1 + 0.R_2 + 0.R_3 = 0$

6406535115712. ✖ $R_2 = 2R_1 + R_3$

Question Id : 6406531527856 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (121 to 122)
Question Label : Comprehension

Consider the matrix A given below:

$$A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

where $0 < \theta < 180°$.

Based on the above data, answer the given subquestions.
Sub questions

Question Number : 121 Question Id : 6406531527857 Question Type : MSQ
Correct Marks : 2 Max. Selectable Options : 0
Question Label : Multiple Select Question
Which of the following is/are true?
Options :
6406535115713. ✔ *A* is an orthogonal matrix
6406535115714. ✔ *A* is invertible
6406535115715. ✖ *A* is symmetric

Question Number : 122 Question Id : 6406531527858 Question Type : MCQ
Correct Marks : 3
Question Label : Multiple Choice Question
Which of the following is true?
Options :
6406535115716. ✔ *A* does not have real eigenvalues
6406535115717. ✖ *A* has two distinct real eigenvalues
6406535115718. ✖ *A* has two real eigenvalues, not necessarily distinct

Question Id : 6406531527859 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (123 to 125)

Question Label : Comprehension

There is no common data for this question. There are three independent sub-questions for which you have to answer True/False.

Sub questions

Question Number : 123 Question Id : 6406531527860 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

If a square matrix *A* is diagonalizable, then *A* is invertible.

Options :

6406535115719. ✖ True

6406535115720. ✔ False

Question Number : 124 Question Id : 6406531527861 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The eigenvalues of a real symmetric matrix are real.

Options :

6406535115721. ✔ True

6406535115722. ✖ False

Question Number : 125 Question Id : 6406531527862 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A square matrix *A* of shape *n* x *n* is diagonalizable if and only if it has *n* distinct eigenvalues.

Options :

6406535115723. ✖ True

6406535115724. ✔ False

Sub-Section Number : 8

Sub-Section Id : 640653244928

Question Shuffling Allowed : No

Question Id : 6406531527849 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (126 to 128)

Question Label : Comprehension

Consider $f : \mathbb{R}^2 \to \mathbb{R}$ and $x = (x_1, x_2)$:

$$f(x) = e^{x_1} + x_2$$

Let $L_{(0,0)}[f](x)$ be the linear approximation of f around the point $(0, 0)$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 126 Question Id : 6406531527850 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question

Which of the following is $L_{(0,0)}[f](x)$?

Options :

6406535115698. ✔ $1 + x_1 + x_2$

6406535115699. ✖ $x_1 + 2x_2$

6406535115700. ✖ $1 - x_1 - x_2$

6406535115701. ✖ $x_1 - x_2$

Question Number : 127 Question Id : 6406531527851 Question Type : SA
Correct Marks : 2
Question Label : Short Answer Question

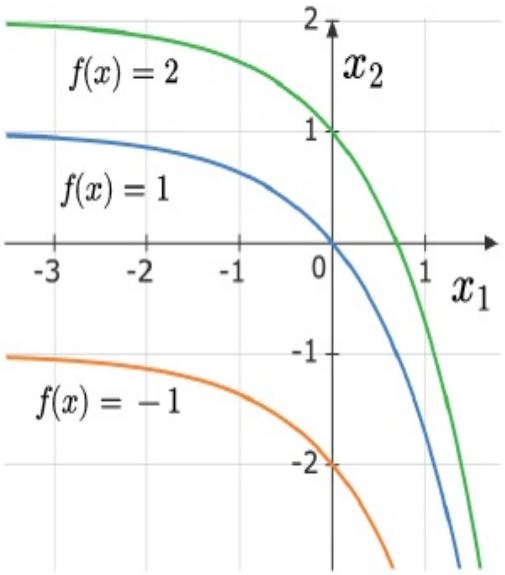
Recall that $L_{(0,0)}[f](x)$ corresponds to a plane in $\mathbb{R}^3$ and can be represented as the set of all points that satisfy the equation $w^T x + b = 0$, where $w \in \mathbb{R}^3, b \in \mathbb{R}$, with w being normal to the plane. If $w^T w = 3$, what is b?

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

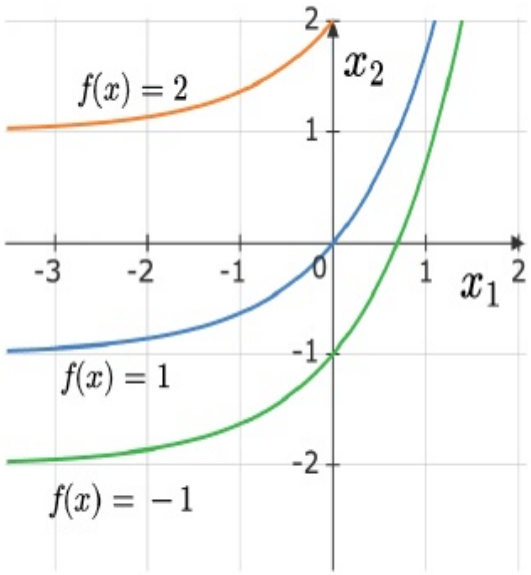
1

Question Number : 128 Question Id : 6406531527852 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question

Which of the following represents the contours of f?



(A)



(B)

Options :

6406535115703. ✔ (A)

6406535115704. ✖ (B)

System commands

Section Id :	640653106046
Section Number :	8
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	16
Number of Questions to be attempted :	16
Section Marks :	50
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