If the application is run locally on http://127.0.0.1:5000 using the command python app.py stable, what will be rendered by the browser for URL http://127.0.0.1:5000/home?

**Options :**

6406531929679. ✖
static url path: /static
static folder: C:\home\mad_1\static

6406531929680. ✖
static url path: /stable
static folder: C:\home\mad_1\stable

6406531929681. ✖
static url path: C:\home\mad_1\stable
static folder: /stable

6406531929682. ✔
static url path: /stable
static folder: C:\home\mad_1\static

# MLF

| | |
|---|---|
| **Section Id :** | 64065339073 |
| **Section Number :** | 8 |
| **Section type :** | Online |
| **Mandatory or Optional :** | Mandatory |
| **Number of Questions :** | 15 |
| **Number of Questions to be attempted :** | 15 |
| **Section Marks :** | 50 |
| **Display Number Panel :** | Yes |
| **Group All Questions :** | No |

| | |
|---|---|
| **Enable Mark as Answered Mark for Review and Clear Response :** | Yes |
| **Maximum Instruction Time :** | 0 |
| **Sub-Section Number :** | 1 |
| **Sub-Section Id :** | 64065382594 |
| **Question Shuffling Allowed :** | No |
| **Is Section Default? :** | null |

**Question Number : 119 Question Id : 640653577871 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**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 :**

6406531929719. ✔ YES

6406531929720. ✖ NO

| | |
|---|---|
| **Sub-Section Number :** | 2 |
| **Sub-Section Id :** | 64065382595 |
| **Question Shuffling Allowed :** | Yes |
| **Is Section Default? :** | null |

**Question Number : 120 Question Id : 640653577872 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction**

**Time : 0**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following statements are correct?

**Options :**

6406531929721. ✔ $\mathrm{I}(444\%3 = 0 \text{ and } \pi \in \mathbb{R}) = 1.$

6406531929722. ✖ Mean Squared Error (MSE) is a suitable loss function for classification problems.

6406531929723. ✖ The loss obtained after applying encoder and decoder functions to a given data can be negative.

6406531929724. ✔ Gaussian mixture model is a family of distributions for modeling multimodal data.

**Question Number : 121 Question Id : 640653577884 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following statements is/are true?

**Options :**

6406531929745. ✔ Row space of a matrix is orthogonal to the null space of the matrix.

6406531929746. ✖ Row space of a matrix is orthogonal to the null space of transpose of the matrix.

6406531929747. ✔ Dimension of row space of a matrix is always equal to the dimension of column space of the matrix.

6406531929748. ✖ Dimension of row space of a matrix need not be equal to the dimension of column space of the matrix.

**Question Number : 122 Question Id : 640653577886 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following matrices have eigenvectors as $\begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}$, $\begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$ ?

**Options :**

6406531929753. ✔ $\begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$

6406531929754. ✔ $\begin{bmatrix} 6 & 4 & 8 \\ 4 & 0 & 4 \\ 8 & 4 & 6 \end{bmatrix}$

6406531929755. ✖ $\begin{bmatrix} 2 & 1 & 4 \\ 4 & 0 & 4 \\ 8 & 4 & 6 \end{bmatrix}$

6406531929756. ✖ $\begin{bmatrix} 3 & 1 & 0 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$

**Question Number : 123 Question Id : 640653577887 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Let the matrix $A \in \mathbb{R}^{d \times d}$ be diagonalizable, then which of the following statements is/are true for $A$?

**Options :**

6406531929757. ✖ $A$ must be symmetric.

6406531929758. ✔ We can find a basis of eigenvectors for $\mathbb{R}^d$.

6406531929759. ✖ We can find an orthonormal basis of eigenvectors for $\mathbb{R}^d$.

6406531929760. ✔ $A$ can have some repeated eigenvalues but must have distinct independent eigenvectors.

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|---|---|
| **Sub-Section Number :** | 3 |
| **Sub-Section Id :** | 64065382596 |
| **Question Shuffling Allowed :** | Yes |
| **Is Section Default? :** | null |

**Question Number : 124 Question Id : 640653577879 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Let $A, B \in \mathbb{R}^{n \times n}$ be two matrices, then which among the following statements are correct?

**Options :**

6406531929737. ✔ $x \in \text{Nullspace}(A) \implies x \in \text{Nullspace}(BA)$.

6406531929738. ✔ $x \in \text{Columnspace}(A) \implies x \in \text{Columnspace}(B)$, where $A = BC, C \in \mathbb{R}^{n \times n}$.

6406531929739. ✔ $x \in \text{Nullspace}(AB) \implies Bx \in \text{Nullspace}(A)$.

**6406531929740.** ✖ $x \in \text{Nullspace}(AB) \implies x \in \text{Nullspace}(B).$

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**Question Number : 125 Question Id : 640653577885 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the solution of the linear regression problem $(Ax = b)$ using least squares method, where $A = \begin{bmatrix} 1 & 5 & 5 \\ 2 & 3 & 5 \\ 0 & 7 & 1 \end{bmatrix}$ and $b = \begin{bmatrix} 7 \\ 8 \\ 4 \end{bmatrix}$.

Based on this data, which of the following statements is/are true?

**Options :**

**6406531929749.** ✔ The error value is zero as we can get an $x$ such that $Ax$ is exactly equal to $b$.

**6406531929750.** ✖ The error value is non-zero as we cannot get an $x$ such that $Ax$ is exactly equal to $b$.

**6406531929751.** ✔ Least squares solution for $x$ is $\begin{bmatrix} 2 \\ 0.5 \\ 0.5 \end{bmatrix}$.

**6406531929752.** ✖ Least squares solution for $x$ is $\begin{bmatrix} 1 \\ 0.6 \\ 0.4 \end{bmatrix}$.

| | |
|---|---|
| **Sub-Section Number :** | 4 |
| **Sub-Section Id :** | 64065382597 |
| **Question Shuffling Allowed :** | Yes |
| **Is Section Default? :** | null |

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**Question Number : 126 Question Id : 640653577877 Question Type : MCQ Is Question**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Find the linear approximation of the function $f(x, y) = ye^{xy}$ in the neighbourhood of $(0,1)$.

**Options :**

6406531929729. ✔ $x + y$

6406531929730. ✘ $x + 2y$

6406531929731. ✘ $2x + y$

6406531929732. ✘ $2x + 3y$

**Question Number : 127 Question Id : 640653577878 Question Type : MCQ Is Question**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Let $f : \mathbb{R}^2 \to \mathbb{R}$, given by $f(x, y) = x^2 + y^2$. Consider the following algorithm:

$$X_{n+1} = X_n - h\nabla f(X_n), \quad X_i \in \mathbb{R}^2, i : 1, 2, \ldots \text{ and } h > 0,$$

where $h$ is the step size and $\nabla f(X_n)$ is the gradient of $f$ evaluated at $X_n$. Fix $h = 0.25$ and $X_0 = (1, 3)$, which among the following points does the algorithm converge to?

**Options :**

6406531929733. ✘ (1, 3)

6406531929734. ✘ (1/2, 1/6)

6406531929735. ✔ (0, 0)

| | |
|---|---|
| **Sub-Section Number :** | 5 |
| **Sub-Section Id :** | 64065382598 |
| **Question Shuffling Allowed :** | Yes |
| **Is Section Default? :** | null |

**Question Number : 128 Question Id : 640653577873 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4**

Question Label : Short Answer Question

Consider the following dataset with 5 data points:

| $X$ | $y$ |
|---|---|
| $(2, 3)$ | 5 |
| $(-1, 1)$ | 2 |
| $(4, 2)$ | 7 |
| $(0, -2)$ | 1 |
| $(-3, 5)$ | 4 |

We want to fit a linear regression model of the form $f(X) = w^T x$ to this dataset, where $w = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$. Compute the value of the loss function $L$ for this dataset which is defined as $L = \max_i |f(x^i) - y^i|$.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

5

**Question Number : 129 Question Id : 640653577874 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4**

Question Label : Short Answer Question

Let $f(x_1, x_2, x_3) = \dfrac{x_1 + x_2 + x_3}{2}$ be used as an encoder function and $g(u) = [u, u, u]$ be used as a decoder function for dimensionality reduction of the dataset $X_1 = [1, 2, 3]$, $X_2 = [2, 4, 6]$, $X_3 = [3, 6, 9]$, $X_4 = [4, 8, 12]$. Calculate the reconstruction error $\left( R(f, g) = \dfrac{1}{n} \sum\limits_{i=1}^{n} \| x_i - g(f(x_i)) \|^2 \right)$ for this encoder decoder pair. Enter the answer correct to one decimal place.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

37 to 38

**Question Number : 130 Question Id : 640653577883 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4**

Question Label : Short Answer Question

Let $P_1$ be the projection matrix onto the line spanned by the vector $a = [1, 2, 3]^T$. Let $P_2$ be the projection matrix that projects vectors onto the plane perpendicular to span of $a$. Find the determinant of $P_1 + P_2$.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Sub-Section Number :** 6

**Sub-Section Id :** 64065382599

**Question Shuffling Allowed :** Yes

**Is Section Default? :** null

**Question Number : 131 Question Id : 640653577875 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 3**

Question Label : Short Answer Question

Find the directional derivative of $f(x, y, z) = x(x^2 - y^2) - z$ at a point $D(1, -1, 0)$ in the direction of vector $\hat{h} = \frac{2}{7}i - \frac{3}{7}j + \frac{6}{7}k$. 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 :**

-1.16 to -1.12

| **Sub-Section Number :** | 7 |
|---|---|
| **Sub-Section Id :** | 64065382600 |
| **Question Shuffling Allowed :** | Yes |
| **Is Section Default? :** | null |

**Question Number : 132 Question Id : 640653577876 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Short Answer Question

Let the function $f(x) = \begin{cases} ax - 3, & x < 2 \\ 4, & x = 2 \\ 2x, & x > 2 \end{cases}$

be continuous for all $x \in \mathbb{R}$. Then, find the value of $a$.

Enter the answer correct to one decimal place.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3.5

**Sub-Section Number :** 8

**Sub-Section Id :** 64065382601

**Question Shuffling Allowed :** No

**Is Section Default? :** null

**Question Id : 640653577880 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Question Numbers : (133 to 134)**

Question Label : Comprehension

Let $A = \begin{pmatrix} 1 & -1 \\ 1 & 1 \\ 1 & 2 \end{pmatrix}$ and $b = \begin{pmatrix} 1 \\ 1 \\ 3 \end{pmatrix}$.

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 133 Question Id : 640653577881 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Is the system $Ax = b$ consistent?

**Options :**

6406531929741. ✖ Yes

**Question Number : 134 Question Id : 640653577882 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 3**

Question Label : Short Answer Question

Using the least square approximation, find the length of the projection vector $p$ of $b$ onto the column space of $A$. 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 :**

3.12 to 3.16

# Java

| | |
|---|---|
| **Section Id :** | 64065339074 |
| **Section Number :** | 9 |
| **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 |
| **Group All Questions :** | No |
| **Enable Mark as Answered Mark for Review and Clear Response :** | Yes |
| **Maximum Instruction Time :** | 0 |