6406532867011. ✖ The background colour of the password field remains red for the first 4 letters, then turns green for the next 4 letters, and then again turns red for the remaining letters.

6406532867012. ✔ The background colour of the password field remains red for the first 4 letters, then turns green for the next 4 letters, and then remains green for the remaining allowable letters.

MLF

Section Id :	64065360926
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 :	640653126842
Question Shuffling Allowed :	No

Question Number : 50 Question Id : 640653852376 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 :

6406532867017. ✔ YES

6406532867018. ✖ NO

Sub-Section Number : 2

Sub-Section Id : 640653126843

Question Shuffling Allowed : No

Question Id : 640653852377 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (51 to 52)

Question Label : Comprehension

Consider the quadratic form $f(x_1, x_2, x_3) = \begin{pmatrix} x_1 & x_2 & x_3 \end{pmatrix} A \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = 2x_1x_2 + 4x_2x_3 - x_1^2 - 5x_2^2 - 3x_3^2$, where A is a matrix.

Use the above information to answer the given sub-questions.

Sub questions

Question Number : 51 Question Id : 640653852378 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following options represents matrix *A*?

Options :

6406532867019. ✖ $\begin{pmatrix} 1 & 1 & 0 \\ 1 & -5 & 2 \\ 0 & 2 & -3 \end{pmatrix}$

6406532867020. ✖ $\begin{pmatrix} -1 & -1 & 0 \\ 1 & -5 & 2 \\ 0 & 2 & -3 \end{pmatrix}$

6406532867021. ✔ $\begin{pmatrix} -1 & 1 & 0 \\ 1 & -5 & 2 \\ 0 & 2 & -3 \end{pmatrix}$

6406532867022. ✖ $\begin{pmatrix} 1 & -1 & 0 \\ 1 & -5 & 2 \\ 0 & 2 & -3 \end{pmatrix}$

Question Number : 52 Question Id : 640653852379 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The matrix *A* is

Options :

6406532867023. ✖ positive definite.

6406532867024. ✔ negative definite.

Sub-Section Number : 3

Sub-Section Id : 640653126844

Question Shuffling Allowed : Yes

Question Number : 53 Question Id : 640653852380 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider a matrix $A = \begin{pmatrix} 1 & 1+i & 2i & 9 \\ 1-i & 3 & 4 & 7-i \\ -2i & 4 & 5 & i \\ 9 & 7+i & -i & 7 \end{pmatrix}$. Which of the following options is/are true?

Options :

6406532867025. ✔ *A* is a Hermitian matrix.

6406532867026. ✔ *A* is digonalizable.

6406532867027. ✔ All eigenvalue of *A* real.

6406532867028. ✖ *A* has eigenvalues that are neither real nor purely imaginary.

Sub-Section Number : 4

Sub-Section Id : 640653126845

Question Shuffling Allowed : No

Question Id : 640653852381 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (54 to 56)

Question Label : Comprehension

Consider a matrix $A = \begin{pmatrix} 1 & 0 & 1 \\ 1 & 0 & -1 \end{pmatrix}$. Let singular value decomposition (SVD) form of A can be written as $A = Q_1 \sum Q_2^T$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 54 Question Id : 640653852382 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following options is true?

Options :

6406532867029. ✖

$Q_1 = \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

6406532867030. ✔ $Q_1 = \frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

6406532867031. ✖ $Q_1 = \frac{1}{\sqrt{3}} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

6406532867032. ✖ $Q_1 = \sqrt{2} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

Question Number : 55 Question Id : 640653852383 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question
Which of the following options is true ?
Options :

6406532867033. ✔ $Q_2 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$

6406532867034. ✖ $Q_2 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 0 \end{pmatrix}$

6406532867035. ✖ $Q_2 = \begin{pmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$

6406532867036. ✖ $Q_2 = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$

Question Number : 56 Question Id : 640653852384 Question Type : MCQ
Correct Marks : 1
Question Label : Multiple Choice Question
Which of the following options is true ?
Options :

6406532867037. ✖ $\Sigma = \begin{pmatrix} \sqrt{2} & 0 & 0 \\ 0 & -\sqrt{2} & 0 \end{pmatrix}$

6406532867038. ✖ $\Sigma = \begin{pmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \end{pmatrix}$

6406532867039. ✖ $\Sigma = \begin{pmatrix} -\sqrt{2} & 0 & 0 \\ 0 & -\sqrt{2} & 0 \end{pmatrix}$

6406532867040. ✔ $\Sigma = \begin{pmatrix} \sqrt{2} & 0 & 0 \\ 0 & \sqrt{2} & 0 \end{pmatrix}$

Sub-Section Number : 5
Sub-Section Id : 640653126846
Question Shuffling Allowed : Yes

Question Number : 57 Question Id : 640653852385 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0
Question Label : Multiple Select Question
Which of the following options is/are true?
Options :
6406532867041. ✖ Any matrix of order $n \times m$ is similar to an upper triangular matrix.
6406532867042. ✖ If a matrix A is not symmetric, then A^TA can not be a symmetric matrix.
6406532867043. ✔ If A is a positive definite matrix then $A^2 + I$ positive definite.
6406532867044. ✔ For any matrix A, A^TA is orthogonally diagonalizable.

Question Number : 58 Question Id : 640653852386 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0
Question Label : Multiple Select Question
Consider a matrix $A = \begin{pmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ \frac{i}{\sqrt{2}} & \frac{-i}{\sqrt{2}} \end{pmatrix}$. Which of the following options is/are true?
Options :
6406532867045. ✔ A is a unitary matrix.

6406532867046. ✖ Let v be any vector in $\mathbb{R}^2$. Then $||Av|| = ||v||$ may or may not be true.

6406532867047. ✔ Eigenvectors of A are orthogonal.

6406532867048. ✔ Let α be an eigenvalue of A. Then $|\alpha| = 1$

Sub-Section Number : 6
Sub-Section Id : 640653126847
Question Shuffling Allowed : Yes

Question Number : 59 Question Id : 640653852387 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question
What is the primary goal of Principal Component Analysis (PCA)?
Options :
6406532867049. ✔ To find the directions that capture the maximum variance in the data.
6406532867050. ✖ To find directions that capture the minimum variance in the data.
6406532867051. ✖ To increase the dimensionality of the data.
6406532867052. ✖ To reduce the number of data points.

Sub-Section Number : 7
Sub-Section Id : 640653126848
Question Shuffling Allowed : No

Question Id : 640653852388 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (60 to 62)
Question Label : Comprehension
Consider the following dataset:

$$\left\{ \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 2 \\ 0 \end{pmatrix}, \begin{pmatrix} 2 \\ 0 \\ 2 \end{pmatrix} \right\}$$

Suppose we want to project the above dataset onto a one-dimensional space using PCA.

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

Question Number : 60 Question Id : 640653852389 Question Type : MCQ
Correct Marks : 3
Question Label : Multiple Choice Question
Compute the sample covariance matrix *C* for the given dataset.

Options :

6406532867053. ✖ $C = \frac{1}{3}\begin{pmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 2 & 2 & 2 \end{pmatrix}$

6406532867054. ✔ $C = \frac{1}{3}\begin{pmatrix} 2 & -2 & 2 \\ -2 & 2 & -2 \\ 2 & -2 & 2 \end{pmatrix}$

6406532867055. ✖ $C = \frac{1}{3}\begin{pmatrix} -2 & 2 & -2 \\ 2 & -2 & 2 \\ -2 & 2 & -2 \end{pmatrix}$

6406532867056. ✖ $C = \begin{pmatrix} -2 & 2 & -2 \\ 2 & -2 & 2 \\ -2 & 2 & -2 \end{pmatrix}$

Question Number : 61 Question Id : 640653852390 Question Type : MCQ
Correct Marks : 3
Question Label : Multiple Choice Question
Which is the principal direction that is chosen for performing PCA?
Options :

6406532867057. ✖ $\begin{pmatrix} 1/\sqrt{3} \\ -1/\sqrt{3} \\ -1/\sqrt{3} \end{pmatrix}$

6406532867058. ✖ $\begin{pmatrix} 1/\sqrt{2} \\ 1/\sqrt{2} \\ 0 \end{pmatrix}$

6406532867059. ✖ $\begin{pmatrix} -1/\sqrt{2} \\ 1/\sqrt{2} \\ 0 \end{pmatrix}$

6406532867060. ✔ $\begin{pmatrix} 1/\sqrt{3} \\ -1/\sqrt{3} \\ 1/\sqrt{3} \end{pmatrix}$

Question Number : 62 Question Id : 640653852391 Question Type : MCQ
Correct Marks : 3
Question Label : Multiple Choice Question

If $\tilde{x}_1, \tilde{x}_2$, and $\tilde{x}_3$ are the projections of the data points onto the first principal component, then which among the following are true?

Options :

6406532867061. ✖ $\tilde{x_1} = \begin{pmatrix} 4 \\ -2 \\ 1 \end{pmatrix}, \tilde{x_2} = \begin{pmatrix} -2 \\ 4 \\ -1 \end{pmatrix}, \tilde{x_3} = \begin{pmatrix} 7 \\ -1 \\ 4 \end{pmatrix}$

6406532867062. ✖ $\tilde{x_1} = \begin{pmatrix} -4/3 \\ 2/3 \\ -1/3 \end{pmatrix}, \tilde{x_2} = \begin{pmatrix} 2/3 \\ -4/3 \\ 1/3 \end{pmatrix}, \tilde{x_3} = \begin{pmatrix} -7/3 \\ 1/3 \\ -4/3 \end{pmatrix}$

6406532867063. ✖ $\tilde{x_1} = \begin{pmatrix} 4/3 \\ 2/3 \\ 1/3 \end{pmatrix}, \tilde{x_2} = \begin{pmatrix} 2/3 \\ 4/3 \\ 1/3 \end{pmatrix}, \tilde{x_3} = \begin{pmatrix} 7/3 \\ 1/3 \\ 4/3 \end{pmatrix}$

6406532867064. ✔ $\tilde{x_1} = \begin{pmatrix} 4/3 \\ -2/3 \\ 1/3 \end{pmatrix}, \tilde{x_2} = \begin{pmatrix} -2/3 \\ 4/3 \\ -1/3 \end{pmatrix}, \tilde{x_3} = \begin{pmatrix} 7/3 \\ -1/3 \\ 4/3 \end{pmatrix}$

Sub-Section Number : 8
Sub-Section Id : 640653126849
Question Shuffling Allowed : Yes

Question Number : 63 Question Id : 640653852392 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question
Which of the following statements about choosing the learning rate in gradient descent is incorrect?
Options :
6406532867065. ✖ A small learning rate can lead to slow convergence.
6406532867066. ✖ A large learning rate can cause the loss function to fluctuate around the minimum.
6406532867067. ✖ A large learning rate can cause divergence.
6406532867068. ✔ A small learning rate always causes the training to progress very quickly.

Sub-Section Number : 9
Sub-Section Id : 640653126850
Question Shuffling Allowed : Yes

Question Number : 64 Question Id : 640653852393 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question
Consider a function $f(x,y) = (x-1)^2 + (y-2)^2$. Using a gradient descent algorithm, with an initial guess of (0, 0) and learning rate of 0.1, what will be the absolute difference between the value of the function after first and second iteration? Enter the answer correct to three decimal places.
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
1.149 to 1.155

Question Number : 65 Question Id : 640653852394 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question
The value of a function at point 25 is 5. The values of the function's first and second order derivatives at this point are 0.1 and -0.002 respectively. What will be the function's approximate value at the point 25.1? (Enter the answer correct up to three decimal places).
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
5.006 to 5.012

Business Analytics

Section Id : 64065360927
Section Number : 5
Section type : Online
Mandatory or Optional : Mandatory
Number of Questions : 6
Number of Questions to be attempted : 6
Section Marks : 20