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6406531736842. ✖

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6406531736844. ✖

MLF

Section Id :	64065333935
Section Number :	7
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
Sub-Section Number :	1
Sub-Section Id :	64065373942
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 99 Question Id : 640653521088 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"

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 :

6406531736845. ✔ YES

6406531736846. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	64065373943
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 100 Question Id : 640653521093 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Find the rank one approximation of the matrix $A = \begin{bmatrix} 2 & 0 \\ 0 & -3 \\ 0 & 0 \end{bmatrix}$ corresponding to its largest eigenvalue.

Options :

6406531736865. ✖ $\begin{bmatrix} 4 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$

6406531736866. ✖ $\begin{bmatrix} 0 & 0 \\ 0 & 3 \\ 0 & 0 \end{bmatrix}$

6406531736867. ✖ $\begin{bmatrix} 0 & 0 \\ 0 & -9 \\ 0 & 0 \end{bmatrix}$

6406531736868. ✔ $\begin{bmatrix} 0 & 0 \\ 0 & -3 \\ 0 & 0 \end{bmatrix}$

Question Number : 101 Question Id : 640653521100 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

For the dataset $D = \{x_1, x_2, x_3, \ldots, x_n\}$, the matrix

$$C = \frac{1}{n}\sum_{i=1}^{n} x_i {x_i}^T$$

is called the covariance matrix

Options :

6406531736889. ✖ always.

6406531736890. ✖ only when the dataset is centered.

6406531736891. ✖ only when the dataset has the maximum variance.

6406531736892. ✔ Both when the dataset is centered and when the dataset has the maximum variance are correct

Sub-Section Number :	3
Sub-Section Id :	64065373944
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 102 Question Id : 640653521092 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Let $A = \begin{bmatrix} 1 & -i & -1 \\ i & -1 & -i \\ -1 & i & -1 \end{bmatrix}$. What is the unitary diagonalization of A?

Options :

6406531736861. ✔ $\begin{bmatrix} -2/\sqrt{6} & 1/\sqrt{3} & 0 \\ -i/\sqrt{6} & -i/\sqrt{3} & i/\sqrt{2} \\ 1/\sqrt{6} & 1/\sqrt{3} & 1/\sqrt{2} \end{bmatrix} \begin{bmatrix} 2 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -2 \end{bmatrix} \begin{bmatrix} -2/\sqrt{6} & i/\sqrt{6} & 1/\sqrt{6} \\ 1/\sqrt{3} & i/\sqrt{3} & 1/\sqrt{3} \\ 0 & -i/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$

6406531736862. ✖ $\begin{bmatrix} -2/\sqrt{6} & 1/\sqrt{3} & 0 \\ -1/\sqrt{6} & -i/\sqrt{3} & i/\sqrt{2} \\ i/\sqrt{6} & 1/\sqrt{3} & 1/\sqrt{2} \end{bmatrix} \begin{bmatrix} -2 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -2 \end{bmatrix} \begin{bmatrix} -2/\sqrt{6} & -1/\sqrt{6} & i/\sqrt{6} \\ 1/\sqrt{3} & -i/\sqrt{3} & 1/\sqrt{3} \\ 0 & i/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$

6406531736863. ✖ $\begin{bmatrix} -2/\sqrt{6} & 1/\sqrt{3} & 0 \\ -1/\sqrt{6} & -i/\sqrt{3} & i/\sqrt{2} \\ i/\sqrt{6} & 1/\sqrt{3} & 1/\sqrt{2} \end{bmatrix} \begin{bmatrix} -2 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 2 \end{bmatrix} \begin{bmatrix} -2/\sqrt{6} & -1/\sqrt{6} & i/\sqrt{6} \\ 1/\sqrt{3} & -i/\sqrt{3} & 1/\sqrt{3} \\ 0 & i/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$

6406531736864. ✖ $\begin{bmatrix} -1/\sqrt{2} & 1/\sqrt{3} & 0 \\ 0 & -i/\sqrt{3} & i/\sqrt{2} \\ i/\sqrt{2} & 1/\sqrt{3} & 1/\sqrt{2} \end{bmatrix} \begin{bmatrix} -2 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 2 \end{bmatrix} \begin{bmatrix} -1/\sqrt{2} & 0 & i/\sqrt{2} \\ 1/\sqrt{3} & -i/\sqrt{3} & 1/\sqrt{3} \\ 0 & i/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$

Sub-Section Number : 4

Sub-Section Id : 64065373945

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 103 Question Id : 640653521098 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

Let $f(x, y) = x^2y^2 - 2x - 2y$. Which among the following options are correct?

Options :

6406531736881. ✖ (0, 0) is a stationary point of *f*.

6406531736882. ✔ (1, 1) is a stationary point of *f*.

6406531736883. ✖ *f* attains the minimum at (0, 0).

6406531736884. ✖ *f* attains the minimum at (1, 1).

Sub-Section Number : 5

Sub-Section Id : 64065373946

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 104 Question Id : 640653521089 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3 Selectable Option : 0

Question Label : Multiple Select Question

Given three unitary matrices *A,B, and C,* which of the following statements is/are true?

Options :

6406531736847. ✔ *ABC* is always a unitary matrix.

6406531736848. ✖ *A* + *B* is a Hermitian matrix.

6406531736849. ✔ *AB,BC, and AC* are unitary matrices.

6406531736850. ✖ *ABC* may not be a unitary matrix.

Question Number : 105 Question Id : 640653521090 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Selectable Option : 0

Question Label : Multiple Select Question

What can be the eigenvalues for a matrix that is both unitary as well as Hermitian?

Options :

6406531736851. ✖ 0

6406531736852. ✔ 1

6406531736853. ✔ -1

6406531736854. ✖ i

6406531736855. ✖ 2

6406531736856. ✖ -2

Question Number : 106 Question Id : 640653521097 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Selectable Option : 0

Question Label : Multiple Select Question

Let A be a $n \times n$ positive definite matrix. Then which among the following statements are correct?

Options :

6406531736877. ✔ A^{-1} is positive definite

6406531736878. ✔ $A + B$ is positive definite, if B is positive definite.

6406531736879. ✖ $\text{Rank}(A) = n - 1$

6406531736880. ✔ A^2 is positive definite.

Question Number : 107 Question Id : 640653521099 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Selectable Option : 0

Question Label : Multiple Select Question

Which of the following are the limitations of PCA?

Options :

6406531736885. ✖ PCA does work well for non-linearly correlated data.

6406531736886. ✔ PCA always consider the low variance components in the data as noise and recommend us to throw away those components. But, sometimes those components play a major role in a supervised learning task.

6406531736887. ✔ If the variables are correlated, PCA can achieve dimension reduction. If not, PCA just orders them according to their variances.

6406531736888. ✔ PCA always finds orthogonal principal components. Sometimes, our data demands non-orthogonal principal components to represent the data.

Sub-Section Number :	6
Sub-Section Id :	64065373947
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 108 Question Id : 640653521091 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Selectable Option : 0

Question Label : Multiple Select Question

Which of the following matrices are both Hermitian and unitary?

Options :

6406531736857. ✔ $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

6406531736858. ✔ $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{bmatrix}$

6406531736859. ✖ $\begin{bmatrix} 1 & -1 & 0 \\ -1 & 0 & -1 \\ 0 & -1 & 0 \end{bmatrix}$

6406531736860. ✔ $\begin{bmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Sub-Section Number :	7
Sub-Section Id :	64065373948
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 109 Question Id : 640653521101 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

$$x_1 = \begin{bmatrix}1\\1\end{bmatrix}, x_2 = \begin{bmatrix}2\\3\end{bmatrix}, x_3 = \begin{bmatrix}3\\2\end{bmatrix}$$

$$C = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x_i})(x_i - \bar{x_i})^T$$

Here $\bar{x_i} = \dfrac{x_1 + x_2 + x_3}{3}$

What is the sum of the eigenvalues of the covariance matrix C corresponding to the given data points x_1, x_2, x_3? Enter the answer correct to two decimals accuracy.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1.32 to 1.36

Question Number : 110 Question Id : 640653521102 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

Consider the data points

$$x_1 = \begin{bmatrix}1\\2\end{bmatrix}, x_2 = \begin{bmatrix}0\\0\end{bmatrix}, x_3 = \begin{bmatrix}2\\1\end{bmatrix}$$

If we are projecting this dataset onto the first principal component, then what is the projected variance? Enter the answer correct to two decimals accuracy.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.9 to 1.4

Question Number : 111 Question Id : 640653521105 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

If $f(20) = 1, f'(20) = 10$, and $f''(20) = 5$, then what is second order approximate value of $f(10)$? Enter the answer as integer.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

151

Sub-Section Number :	8
Sub-Section Id :	64065373949
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 112 Question Id : 640653521103 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

What is the maximum area of rectangle than can be inscribed in an ellipse of the equation $\frac{x^2}{2} + y^2 = 1$? Enter the answer correct to 2 decimals accuracy.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

2.6 to 3

Question Number : 113 Question Id : 640653521104 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

What is the value of the function $f(x_1, x_2, x_3) = x_1^2 + x_2^2 + x_3^2 - 2x_1x_2 - 2x_2x_3 - 2x_3x_1$ evaluated at the point obtained after one step of gradient descent where the current iterate is $(1, 1, 1)$? Assume $\eta = 1$. Enter the answer as integer.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-3

Sub-Section Number :	9
Sub-Section Id :	64065373950
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653521094 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 : (114 to 115)

Question Label : Comprehension

Consider a matrix $A = \begin{bmatrix} 2 & b \\ b & 8 \end{bmatrix}$. Answer the given subquestions:

Sub questions

Question Number : 114 Question Id : 640653521095 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

For what value of b is the matrix A positive definite?

Options :

6406531736869. ✖ $b < 4$

6406531736870. ✖ $b > -4$

6406531736871. ✖ $b > 4$ and $b < -4$

6406531736872. ✔ $-4 < b < 4$

Question Number : 115 Question Id : 640653521096 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

Find the minimum value of $\frac{1}{2}(2x^2 + 2bxy + 8y^2) - x$ for b in the range defined in the previous question.

Options :

6406531736873. ✔ $\frac{4}{b^2 - 16}$

6406531736874. ✖ $\frac{-4}{b^2-16}$

6406531736875. ✖ $\frac{8}{b^2-16}$

6406531736876. ✖ $\frac{-8}{b^2-16}$

Java

Section Id :	64065333936
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
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 :	64065373951
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 116 Question Id : 640653521106 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction