MLF

Section Id :	64065338412
Section Number :	15
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	17
Number of Questions to be attempted :	17
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 :	64065381010
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 412 Question Id : 640653566398 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 :

6406531892953. ✔ YES

6406531892954. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	64065381011
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 413 Question Id : 640653566399 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 statements regarding classification and regression models are correct ?

Options :

6406531892955. ✔ The task of the regression algorithm is to map the input value (*x*) with the continuous output variable (*y*) but the task of the classification algorithm is to map the input value(x) with the discrete output variable(y).

6406531892956. ✔ In Classification, we try to find the decision boundary, which can divide the dataset into different classes but In Regression, we try to find the best fit line, which can predict the output more accurately.

6406531892957. ✖ The Classification Algorithm can be further divided into Linear and Non-linear classifier and the regression algorithms can be divided into Binary regression and Multi-class regression.

6406531892958. ✖ The task of the regression algorithm is to map the input value (*x*) with the discrete output variable (*y*) but the task of the classification algorithm is to map the input value(x) with the continuous output variable(y).

Sub-Section Number : 3

Sub-Section Id : 64065381012

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 414 Question Id : 640653566400 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

If $f(x, y, z) = e^{(x+y+z)^2}$, Use the linear approximation of f around $(0, 0, 1)$.
Evaluate linear approximation at $(1, 1, 1)$.

Options :

6406531892959. ✔ 3*e*

6406531892960. ✖ 2*e*

6406531892961. ✖ 4*e*

6406531892962. ✖ 5*e*

Question Number : 415 Question Id : 640653566401 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

If *A* is a 10 × 8 real matrix with rank 8, then which among the following is true?

Options :

6406531892963. ✖ There exists at least one $b \in \mathbb{R}^{10}$ for which the system $Ax = b$ has infinite number of solutions.

6406531892964. ✖ For every $b \in \mathbb{R}^{10}$, the system $Ax = b$ has infinite number of solutions.

6406531892965. ✔ There exists at least one $b \in \mathbb{R}^{10}$ for which the system $Ax = b$ has a unique solution.

6406531892966. ✖ For every $b \in \mathbb{R}^{10}$, the system $Ax = b$ has a unique solution.

Question Number : 416 Question Id : 640653566407 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Which among the following is a convex function?

Options :

6406531892981. ✔ $|x| \in \mathbb{R}$

6406531892982. ✖ $e^{-x}, x \in \mathbb{R}$

6406531892983. ✖ $-x^2, x \in \mathbb{R}$

6406531892984. ✖ $\log(1+x), x > -1$

Question Number : 417 Question Id : 640653566412 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider two random variables X and Y with the following information.

$$E(X) = 2,\ E(Y) = 3$$

$$E(X^2) = 9,\ E(Y^2) = 11$$

$$E(XY) = 8$$

Find $var(X + Y)$.

Options :

6406531892998. ✖ 7

6406531892999. ✔ 11

6406531893000. ✖ 10

6406531893001. ✖ 17

6406531893002. ✖ 3

Sub-Section Number :	4
Sub-Section Id :	64065381013
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 418 Question Id : 640653566402 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 statements are correct?

Options :

6406531892967. ✔ If 0 is the eigenvalue of a matrix *A*, then *A* can't be invertible.

6406531892968. ✔ If all the eigenvalues of a matrix *A* are 0, then *A* is a zero matrix.

6406531892969. ✔ If 3 is the eigenvalue of matrix *A* then 9 is the eigenvalue of A^2.

6406531892970. ✖ Every 2 × 2 matrix has atleast one real eigenvector.

Question Number : 419 Question Id : 640653566403 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 statements is/are true?

Options :

6406531892971. ✔ If A is a hermitian matrix, then eigenvectors of matrix A are also eigenvectors of matrix A^n, where $n = 2, 3, 4, \cdots$

6406531892972. ✖ If λ is an eigenvalue of matrix A, then λ will also be the eigenvalue of matrix A^n.

6406531892973. ✔ If λ is an eigenvalue of matrix A, then λ^n will be the eigenvalue of matrix A^n.

6406531892974. ✖ If A is a hermitian matrix and x is an eigenvector of matrix A then nx is an eigenvector of matrix A^n, where $n = 2, 3, 4, \cdots$

Question Number : 420 Question Id : 640653566404 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

Suppose A is a symmetric positive definite matrix and Q is a orthogonal matrix, then which of the following statements is/are true?

Options :

6406531892975.

✖ $Q^T AQ$ is a diagonal matrix.

6406531892976. ✔ $Q^T AQ$ is symmetric positive definite.

6406531892977. ✔ $Q^T AQ$ has the same eigenvalues as A.

6406531892978. ✔ e^{-A} is symmetric positive definite.

Question Number : 421 Question Id : 640653566410 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

A student wants to purchase a snack from a bakery to meet certain dietary requirements by chossing the best combination of brownies and cheesecake. The student is following some new diet trend which requires her to eat maximum of 6 brownies and maximum of 10 cakes. Also total number of brownies and cakes together the student eats should be greater than 12. The cost of 1 piece of brownie(x_1) and 1 piece of cake(x_2) is 50 units and 80 units respectively. Her goal is to satisfy these requirements at minimal cost.

Options :

6406531892990. ✔ In primal linear program, the function to be minimized is $50x_1 + 80x_2$

6406531892991. ✔ Constraints are $x_1 + x_2 > 12$, $x_1 \leq 6$, and $x_2 \leq 10$

6406531892992. ✖ In primal linear program, the function to be minimized is $6x_1 + 10x_2$

6406531892993. ✖ Constraints are $x_1 + x_2 < 12$, $x_1 \geq 6$, and $x_2 \geq 10$

Sub-Section Number : 5

Sub-Section Id : 64065381014

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 422 Question Id : 640653566405 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

Suppose you have a two-dimensional dataset $x_1, x_2, x_3, ...x_n$ with mean zero.

Suppose the covariance matrix $C = \sum_{i=1}^{n} x_i x_i^T = \begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$

For projection using PCA onto a line, what is the reconstruction error ?

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 :

2

Question Number : 423 Question Id : 640653566408 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 maximum value of the function $f(x, y) = 4x^2 - 4xy + y^2$ on the circle $x^2 + y^2 = 25$. 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 :

125

Sub-Section Number : 6

Sub-Section Id : 64065381015

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 424 Question Id : 640653566406 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

By using first order taylor series approximation, what would be the value of $f([3,2,1]^T)$, if $f([1,1,1]^T) = 10$ and $\nabla f([1,1,1]^T) = [2,1,3]^T$? 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 :

15

Sub-Section Number : 7

Sub-Section Id : 64065381016

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 425 Question Id : 640653566409 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

A consumer wants to maximize his utility subject to some constraints. He consumes two goods *x* and *y* and the utility function is the product of *x* and *y*. His budget is Rs.200. The per unit price of goods *x* and *y* are Rs.3 and Rs.4 respectively. Choose the correct optimization problem.

Options :

6406531892986. ✖ maximize $x + y$ subject to $3x + 4y = 200$

6406531892987. ✖ maximize xy subject to $3x + 4y = 200$

6406531892988. ✔ maximize xy subject to $3x - 4y = 200$

6406531892989. ✖ maximize $x + y$ subject to $3x - 4y = 200$

Question Number : 426 Question Id : 640653566411 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

The joint density function of random variables X and Y is given by

$$f_{XY}(x,y) = \begin{cases} (x^3+y^3)/16, & 0<x<2, 0<y<2, \\ 0, & \text{otherwise} \end{cases}$$

What is the value of $P(0<X<1, 0<Y<1)$?

Options :

6406531892994. ✖ $\frac{1}{16}$

6406531892995. ✖ $\frac{1}{2}$

6406531892996.

✖ $\frac{1}{12}$

6406531892997. ✔ $\frac{1}{32}$

Question Number : 427 Question Id : 640653566413 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

Let $X = \begin{pmatrix} X_1 \\ X_2 \end{pmatrix} \sim \text{Normal}\,(\mu, \sum)$, where $\mu = \begin{pmatrix} 5 \\ 10 \end{pmatrix}$ and $\sum = \begin{pmatrix} 1 & 2 \\ 2 & 4 \end{pmatrix}$. What will be the distribution of $Y = 2X_1 + X_2$?

Options :

6406531893003. ✖ $Y \sim \text{Normal}(20, 4)$

6406531893004. ✖ $Y \sim \text{Normal}(20, 8)$

6406531893005. ✔ $Y \sim \text{Normal}(20, 16)$

6406531893006. ✖ $Y \sim \text{Normal}(20, 32)$

Sub-Section Number :	8
Sub-Section Id :	64065381017
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 428 Question Id : 640653566414 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 denote the proportion of voters who support Candidate A for the post of college president. Randomly n selected voters are interviewed, and the fraction who are in favour of candidate A is recorded. Using Chebyshev inequality, find the minimum number of voters who should be interviewed such that the probability that sample mean is within 0.01 of p with probability at least 0.95. Enter the answer as integer.

Hint: If $X \in [a, b]$, population variance $\leq \frac{(b-a)^2}{4}$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

50000