Question Label : Multiple Choice Question

Consider the application is running on 'http://localhost:8080'. Suppose the user visits the URL ' http://127.0.0.1:8080/#/slot/true'. What will be rendered by the browser inside the "router-view"?

Options :

6406531513305. ✔ 1. Slot1

2. Slot2

6406531513306. ✖ 1. Slot2

2. Slot3

6406531513307. ✖ 1. Slot1

6406531513308. ✖ 1. Slot2

Question Number : 340 Question Id : 640653455041 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4.5

Question Label : Multiple Choice Question

Suppose the user visits the URL 'http://127.0.0.1:8080/#/slot/true?offset=1', what will be rendered inside the 'router-view'?

Options :

6406531513309. ✖ 1. Slot1

2. Slot2

6406531513310. ✖ 1. Slot2

2. Slot3

6406531513311. ✖ 1. Slot1

6406531513312. ✔ 1. Slot2

MLF

Section Id :	64065329428
Section Number :	12
Section type :	Online

Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
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 :	64065365781
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 341 Question Id : 640653455045 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 SUBJECT TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406531513321. ✔ YES

6406531513322. ✖ NO

Sub-Section Number :	2

Sub-Section Id : 64065365782

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 342 Question Id : 640653455046 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

For the data sets $(x^i, y^i) = [(1,0),(2,2),(3,4),(4,5),(5,5)], i = 1$ to 5, Consider the regression model $f(x) = x$. What is the mean squared loss of $f(x)$. (Enter 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 :

0.6

Question Number : 343 Question Id : 640653455048 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

Does the limit for the following function exist at x tends to zero?

$$f(x) = \sin\frac{1}{x}, x \neq 0$$

(Provide 1 as answer for 'Yes' and 0 for 'No'.)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Question Number : 344 Question Id : 640653455060 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

For a rectangle whose perimeter is 20 m, use the Lagrange multiplier method to find the dimensions that will maximize the area. What is the value of $\frac{2 \times Length}{Breadth}$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 345 Question Id : 640653455064 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

The heights (in cm) of a randomly selected learner of IITM are normally distributed with unknown mean μ and standard deviation σ. A random sample of 15 learners gave the following heights.

$$109, 143, 133, 160, 106, 152, 177, 161, 142, 124, 152, 148, 138, 129, 180$$

Based on the available information, find the maximum likelihood estimator of μ, the mean height of the learners. 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 :

142 to 146

Sub-Section Number :	3
Sub-Section Id :	64065365783
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 346 Question Id : 640653455047 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 true ?

Options :

6406531513324. ✔ If a function f is continuous at a, then $|f|$ is also continuous at a

6406531513325. ✖ If f is a continuous function at $x = a$ and g is a continuous function at $f(a)$ then gof is not a continuous function at a

6406531513326. ✔ If functions f and g be continuous at a, then $f + g$ is continuous at a

6406531513327. ✔ If functions f and g be continuous at a, then fg is continuous at a

Question Number : 347 Question Id : 640653455050 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 false?

Options :

6406531513330. ✔ A 3 × 3 matrix can have same column space and null space.

6406531513331. ✖ A 6 × 6 matrix can have same column space and null space.

6406531513332. ✖ Dimension of column space is always equal to the dimension of row space

6406531513333. ✔ Column space and row space of a matrix are the same.

Question Number : 348 Question Id : 640653455051 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 false?

Options :

6406531513334. ✔ Rank of a $n \times n$ Hermitian matrix is always equal to n.

6406531513335. ✖ Rank of a $n \times n$ unitary matrix is always equal to n.

6406531513336. ✖ If A is a Hermitian matrix, then A^T is Hermitian.

6406531513337. ✔ Zero can be one of the eigenvalues of a unitary matrix.

Question Number : 349 Question Id : 640653455059 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 is true about the function $f(x) = x^2 + y^2 + 2xy$?

Options :

6406531513359. ✔ It is Convex function.

6406531513360. ✖ Its Hessian matrix is indefinite.

6406531513361. ✔ (0, 0) is a local minima of this function.

6406531513362. ✖ (0, 0) is a local maxima of this function.

Sub-Section Number : 4

Sub-Section Id : 64065365784

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 350 Question Id : 640653455049 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

What is the maximum possible nullity of the 4 × 4 orthogonal matrix?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Sub-Section Number : 5

Sub-Section Id : 64065365785

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 351 Question Id : 640653455058 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

What is value of the function $f(x) = x_1^3 + x_2^3 + x_3^3 - x_1x_2 - x_2x_3 - x_1x_3$ with an initial guess of $(1, 1, 1)$ and a step size of 0.5 after one iteration using gradient descent? Enter the value up to two decimal points accuracy.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

-0.39 to -0.36

Question Number : 352 Question Id : 640653455061 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

While solving for the optimal weight vector (w) for a linear regression problem using gradient descent, we have $y = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $X = \begin{bmatrix} 0 & 1 \\ 1 & 1 \\ 1 & 2 \end{bmatrix}$. $w^t = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ after t iterations. If the value of $w^{t+1} = \begin{bmatrix} i \\ j \end{bmatrix}$ in next iteration using gradient descent method, then what is the absolute value of $|i + j|$? Assume $\eta = 1$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 7

Question Number : 353 Question Id : 640653455063 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

Let X be a uniformly continuous random variable on $[0, 100]$. Pick a real number from $[0, 100]$, call this number 'a'. A number will then drawn from X. The cost incurred in playing this game is as follows:

$$\text{Cost} = \begin{cases} 2(a-x), & \text{if } x \leq a \\ x-a, & \text{if } x > a \end{cases}$$

What number should you pick to minimize the expected cost? 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 :

33 to 34

Sub-Section Number :	6
Sub-Section Id :	64065365786
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 354 Question Id : 640653455052 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 k, the function $f(x) = kx_1^2 + x_2^2 - kx_1x_2$ is positive semi-definite?

Options :

6406531513338. ✖ 0

6406531513339. ✖ 1

6406531513340. ✔ 4

6406531513341. ✖ 2

Question Number : 355 Question Id : 640653455065 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

If $X \sim \text{Poisson}(\lambda)$, then the upper bound for $P(X \geq k)$ where $a > 0$ using Markov's inequality is

Options :

6406531513371. ✖ λk

6406531513372. ✔ $\frac{\lambda}{k}$

6406531513373. ✖ $\frac{1}{\lambda k}$

6406531513374. ✖ $\frac{1}{\lambda}$

Sub-Section Number :	7
Sub-Section Id :	64065365787
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 356 Question Id : 640653455053 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

Let *f* be a function of three variables. The eigenvalues of Hessian of *f* are 2, 4, 1. Then what does *f* give ?

Options :

6406531513342. ✔ Minima.

6406531513343. ✖ Maxima.

6406531513344. ✖ Saddle.

6406531513345. ✖ It can be either maxima or minima.

Question Number : 357 Question Id : 640653455062 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

Using Karush-Kuhn-Tucker conditions, solve the following problem.
maximize $f(x, y) = xy$
subject to $x + y^2 \leq 2$, $x, y \geq 0$
The global maximum is at

Options :

6406531513365. ✖ $(\frac{2}{3}, \frac{4}{3})$

6406531513366. ✖ $(\frac{4}{3}, \sqrt{\frac{1}{2}})$

6406531513367. ✖ $(\frac{2}{3}, \frac{1}{3})$

6406531513368. ✔ $(\frac{4}{3}, \sqrt{\frac{2}{3}})$

Sub-Section Number :	8
Sub-Section Id :	64065365788
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 358 Question Id : 640653455066 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 two continuous random variables W and X be given by:

$$f_{WX}(w,x) = \begin{cases} 6w^2x, & 0 < w, x < 1 \\ 0, & \text{otherwise} \end{cases}$$

Let $Y = W^2, Z = WX$. Find the joint distribution of Y and Z.

Options :

6406531513375. ✖

$$g_{YZ}(y,z) = \begin{cases} \frac{3z}{\sqrt{y}}, & 0 < y < 1, 0 < z < 1 \\ 0, & \text{otherwise} \end{cases}$$

6406531513376. ✖

$$g_{YZ}(y,z) = \begin{cases} -\frac{3z}{\sqrt{y}}, & w^2 < y < 1, 0 < z < 1 \\ 0, & \text{otherwise} \end{cases}$$

6406531513377. ✔

$$g_{YZ}(y,z) = \begin{cases} \frac{3z}{\sqrt{y}}, & w^2 < y < 1, 0 < z < 1 \\ 0, & \text{otherwise} \end{cases}$$

6406531513378. ✖

$$g_{YZ}(y,z) = \begin{cases} 6\sqrt{y}z, & w^2 < y < 1, 0 < z < 1 \\ 0, & \text{otherwise} \end{cases}$$

Sub-Section Number :	9
Sub-Section Id :	64065365789
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 359 Question Id : 640653455054 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

What are the properties of principal components in PCA?

Options :

6406531513346. ✔ All principal components are orthogonal to each other.

6406531513347. ✖ The number of principal components for n-dimensional data are atmost $n-1$.

6406531513348. ✔ The first principal component accounts for most of the possible variability of the original data i.e, maximum possible variance.

6406531513349. ✔ The first principal component is the eigenvector of the covariance matrix corresponding to the maximum eigenvalue.

Sub-Section Number :	10
Sub-Section Id :	64065365790
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653455055 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 : (360 to 361)

Question Label : Comprehension

A company manufactures two types of products, A and B. Market research and available resources have indicated that the combined production level should not exceed 1200 products per week and demand for products of type B is at most half of that times production of products of type A. Further, the production level of products of type A can exceed three times the production of products of other type at most 600 units. If the company makes profits of $12 and $16 per products respectively on products A and B. If the number of products manufactured of type A and type B are x and y respectively, then formulate this problem so that the company can maximize the profit.

Based on the above data answer the given subquestions

Sub questions

Question Number : 360 Question Id : 640653455056 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

The objective function for the problem is

Options :

6406531513350. ✔ max 12x +16y

6406531513351. ✖ max 50x + 15y

6406531513352. ✖ min 12x − 16y

6406531513353. ✖ max 50x − 15y

Question Number : 361 Question Id : 640653455057 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

The constraint function for the problem is

Options :

6406531513354. ✔ $x \geq 0, y \geq 0$

6406531513355. ✖ $y \geq \frac{x}{2}$

6406531513356. ✔ $x - 3y \leq 600$

6406531513357. ✖ $x + y \geq 1200$