id	name	age	grade
1	Alice	20	A
2	Bob	21	B
3	Charlie	20	C
4	David	22	A

Which of the following SQL queries will return the **names of students who are 20 years old and have grade 'A'**?

Options :

6406535937236. ✔ SELECT name FROM students WHERE age = 20 AND grade = 'A';

6406535937237. ✖ SELECT * FROM students WHERE age = 20 OR grade = 'A';

6406535937238. ✔ SELECT name FROM students WHERE students.age = 20 AND grade = 'A';

6406535937239. ✖ SELECT name FROM students WHERE student.grade = 'A' OR student.age = 20;

MLF

Section Id :	640653122504
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
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 :	640653325007
Question Shuffling Allowed :	No

Question Number : 64 Question Id : 6406531828164 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 :

6406535937240. ✔ YES

6406535937241. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	640653325008
Question Shuffling Allowed :	Yes

Question Number : 65 Question Id : 6406531828165 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the quadratic form $f(x,y,z) = x^2 - y^2 + 2z^2 + 2xy - 4yz + 4xz$. If $f(x,y,z) = v^T Av$, where $v = (x,y,z)^T$ and A is a 3×3 matrix, which of the following is A?

Options :

6406535937242. ✔ $\begin{bmatrix} 1 & 1 & 2 \\ 1 & -1 & -2 \\ 2 & -2 & 2 \end{bmatrix}$

6406535937243. ✖ $\begin{bmatrix} 1 & 2 & 2 \\ 0 & -1 & -1 \\ 2 & -2 & 2 \end{bmatrix}$

6406535937244. ✖ $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & -4 \\ 2 & -2 & 2 \end{bmatrix}$

6406535937245. ✖

$$\begin{bmatrix} 1 & 3 & 2 \\ 1 & -1 & -2 \\ 1 & -1 & 1 \end{bmatrix}$$

Sub-Section Number : 3
Sub-Section Id : 640653325009
Question Shuffling Allowed : Yes

Question Number : 66 Question Id : 6406531828166 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0
Question Label : Multiple Select Question

Consider $A = \begin{bmatrix} d & \sqrt{2} \\ \sqrt{2} & d \end{bmatrix}$ with $d \in \mathbb{R}$. Which of the following is/are true?

Options :

6406535937246. ✔ If $d > \sqrt{2}$, then A is positive definite.

6406535937247. ✖ If $d < -\sqrt{2}$, then A is positive definite.

6406535937248. ✔ If $d = \sqrt{2}$, then A is not invertible.

6406535937249. ✖ If $d > \sqrt{2}$, then A is not invertible.

Sub-Section Number : 4
Sub-Section Id : 640653325010
Question Shuffling Allowed : Yes

Question Number : 67 Question Id : 6406531828167 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

Consider a matrix A of shape 2×2. The SVD of A is given by $U\Sigma V^T$. The columns of U are the left singular vectors and the columns of V are the right singular vectors. The following details are given:

• The first left singular vector is $u = \left(\frac{1}{\sqrt{5}}, \frac{2}{\sqrt{5}}\right)$
• The first right singular vector is

$$v = \left(\frac{2}{\sqrt{5}}, \frac{1}{\sqrt{5}}\right)$$

• The first singular value is $\sigma = 5$

Find $v^T A v$.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :

3.9 to 4.1

Sub-Section Number :	5
Sub-Section Id :	640653325011
Question Shuffling Allowed :	Yes

Question Number : 68 Question Id : 6406531828168 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

Suppose $x + y = 16$. What is the value of xy when $x^3 + y^3$ is minimum?

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :

63.9 to 64.1

Sub-Section Number :	6
Sub-Section Id :	640653325012
Question Shuffling Allowed :	No

Question Id : 6406531828169 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (69 to 70)
Question Label : Comprehension

For each sub-question, answer whether it is true or false.

Sub questions

Question Number : 69 Question Id : 6406531828170 Question Type : MCQ
Correct Marks : 2

Question Label : Multiple Choice Question

The singular value decomposition exists only for square matrices.

Options :

6406535937252. ✖ True

6406535937253. ✔ False

Question Number : 70 Question Id : 6406531828171 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

If A is Hermitian, then eigenvectors corresponding to distinct eigenvalues are orthogonal.

Options :

6406535937254. ✔ True

6406535937255. ✖ False

Sub-Section Number :	7
Sub-Section Id :	640653325013
Question Shuffling Allowed :	No

Question Id : 6406531828172 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (71 to 73)

Question Label : Comprehension

Consider a unitary matrix U as given below:

$$U = \frac{1}{2}\begin{bmatrix} 1+i & x \\ 1-i & y \end{bmatrix}$$

Also, $\frac{x}{y} = a + ib$ and $a, b \in \mathbb{R}$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 71 Question Id : 6406531828173 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the value of a.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

-0.1 to 0.1

Question Number : 72 Question Id : 6406531828174 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the value of b.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

-1.1 to -0.9

Question Number : 73 Question Id : 6406531828175 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Let S be the set of all unitary matrices U which have the form given in the question, that is, the first column of U is the vector $\left(\frac{1+i}{2}, \frac{1-i}{2}\right)^T$. Which of the following is true?

Options :

6406535937258. ✔ S is an infinite set.

6406535937259. ✖ S is a finite set that has at least two elements.

6406535937260. ✖ S is an empty set.

6406535937261. ✖ S has exactly one element.

Sub-Section Number :	8
Sub-Section Id :	640653325014
Question Shuffling Allowed :	No

Question Id : 6406531828176 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (74 to 75)

Question Label : Comprehension

Consider $A = \frac{1}{4}\begin{bmatrix} 3 & -1 \\ -1 & 3 \end{bmatrix}$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 74 Question Id : 6406531828177 Question Type : MCQ
Correct Marks : 3
Question Label : Multiple Choice Question

Which of the following are the singular values of A?

Options :

6406535937262. ✔ $1, \frac{1}{2}$

6406535937263. ✖ $\frac{3}{2}, 0$

6406535937264. ✖ $2, \frac{-1}{2}$

Question Number : 75 Question Id : 6406531828178 Question Type : MCQ
Correct Marks : 3
Question Label : Multiple Choice Question

If B is a symmetric matrix, consider statements P and Q.

- **P:** If λ is an eigenvalue of B, then λ is a singular value of B.
- **Q:** If λ is a singular value of B, then λ is an eigenvalue of B.

Select the most appropriate option.

Hint: In the first sub-question, A is symmetric, and you should first look at its eigenvalues, which will lead you to some observations. Are these observations true for any symmetric matrix?

Options :

6406535937265. ✖ P is true, Q is false

6406535937266. ✖ Q is true, P is false

6406535937267. ✖ Both P and Q are true

6406535937268. ✔ Both P and Q are false

Sub-Section Number :	9
Sub-Section Id :	640653325015
Question Shuffling Allowed :	No

Question Id : 6406531828179 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Question Numbers : (76 to 78)

Question Label : Comprehension

Consider the task of minimizing the function $f(x, y) = x^2 + y^2$. Let (x_0, y_0) be some arbitrary point in the plane other than the origin.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 76 Question Id : 6406531828180 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Starting at (x_0, y_0), run two steps of gradient descent with learning rate $\eta = 0.2$ to obtain (x_2, y_2). If $(x_2, y_2) = \alpha \cdot (x_0, y_0)$, enter the value of α correct to two places after the decimal.

Note that the sequence of iterates will be: $(x_0, y_0) \rightarrow (x_1, y_1) \rightarrow (x_2, y_2)$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.35 to 0.37

Question Number : 77 Question Id : 6406531828181 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

For what value of η will gradient descent reach the minimum after exactly one step? Enter your 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 :

0.49 to 0.51

Question Number : 78 Question Id : 6406531828182 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Gradient descent is said to converge to the minimum $p^* = (x^*, y^*)$, if the point $p_t = (x_t, y_t)$ gets increasingly closer to p^* as t increases, that is, $\|p^* - p_t\|$ approaches zero as t approaches infinity. Select all values of η for which gradient descent converges to the minimum in this problem.

Options :

6406535937271. ✔ 0.3

6406535937272. ✔ 0.9

6406535937273. ✖ 1

6406535937274. ✖ 1.3

Sub-Section Number : 10

Sub-Section Id : 640653325016

Question Shuffling Allowed : No

Question Id : 6406531828183 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Question Numbers : (79 to 81)

Question Label : Comprehension

Consider a dataset $D = \{(-2, -2), (-1, -1), (0, 0), (1, 1), (2, 2)\}$ of five points in $\mathbb{R}^2$. We perform PCA on this dataset.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 79 Question Id : 6406531828184 Question Type : SA Correct Marks : 3

Question Label : Short Answer Question

If the covariance matrix of the dataset is $C = \begin{bmatrix} a & a \\ a & a \end{bmatrix}$, find a.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1.9 to 2.1

Question Number : 80 Question Id : 6406531828185 Question Type : SA
Correct Marks : 2
Question Label : Short Answer Question

If the unit-norm eigenvector corresponding to the largest eigenvalue of C is v, find $v^T C v$.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
3.9 to 4.1

Question Number : 81 Question Id : 6406531828186 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question

The data-points $(100, 100)$ and $(-100, -100)$ are added to D to get D'. PCA is run on D'. The covariance matrix of D' is C' and the unit-norm eigenvector corresponding to the largest eigenvalue of C' is v'. Which of the following is true?

Options :

6406535937277. ✔ $v' = v$ or $v' = -v$

6406535937278. ✖ v and v' are orthogonal to each other

6406535937279. ✖ The angle between v and v' is $45°$

6406535937280. ✖ We can't comment on the angle between v and v' with the given information

Java

Section Id :	640653122505
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	16
Number of Questions to be attempted :	16
Section Marks :	100
Display Number Panel :	Yes