Question Number : 80 Question Id : 6406531252034 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The college wants to store **archived counseling records** from past students for future reference. These records are **rarely accessed**, but cost efficiency and storage density are important. Which storage type is best suited?

Options :

6406534218010. ✖ Registers

6406534218011. ✖ SRAM

6406534218012. ✔ Hard Disk Drive (HDD)

6406534218013. ✖ DRAM

MLF

Section Id :	64065387634
Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	13
Number of Questions to be attempted :	13
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 :	640653194509
Question Shuffling Allowed :	No

Question Number : 81 Question Id : 6406531252035 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 :

6406534218014. ✔ YES

6406534218015. ✖ NO

Sub-Section Number : 2

Sub-Section Id : 640653194510

Question Shuffling Allowed : Yes

Question Number : 82 Question Id : 6406531252036 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Let X be an exponentially distributed random variable with parameter $\lambda = 1$.
What is the CDF(cumulative distribution function), $F_X(5)$?

Options :

6406534218016. ✔ $F_X(5) = 1 - e^{-5}$

6406534218017. ✖ $F_X(5) = 1 + e^{-5}$

6406534218018. ✖ $F_X(5) = e^{-5}$

6406534218019. ✖ $F_X(5) = e^{-5} - 1$

Sub-Section Number : 3

Sub-Section Id : 640653194511

Question Shuffling Allowed : Yes

Question Number : 83 Question Id : 6406531252037 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

The random variable y is being transformed according to the measurement mapping:

$$z = Cy + \epsilon,$$

where:

- $z \in \mathbb{R}^d$,
- $C \in \mathbb{R}^{d \times n}$,
- $\epsilon \sim \mathcal{N}(0, \sigma^2 I_d)$ is independent Gaussian (measurement) noise.

Which of the following represents the conditional probability distribution $p(z \mid y)$?

Options :

6406534218020. ✔ $p(z \mid y) = \mathcal{N}(Cy, \sigma^2 I_d)$

6406534218021. ✖ $p(z \mid y) = \mathcal{N}(Cy, C^T \sigma^2 I_d C)$

6406534218022. ✖ $p(z \mid y) = \mathcal{N}(y, \sigma^2 I_d)$

6406534218023. ✖ $p(z \mid y) = \mathcal{N}(Cy, \sigma^2 C C^T)$

Sub-Section Number : 4
Sub-Section Id : 640653194512
Question Shuffling Allowed : Yes

Question Number : 84 Question Id : 6406531252038 Question Type : MSQ
Correct Marks : 3 Max. Selectable Options : 0
Question Label : Multiple Select Question
Which of the following statements about singular value decomposition (SVD) is/are true?
Options :
6406534218024. ✖ Singular value decomposition is possible only for a square matrix.
6406534218025. ✖ Singular value decomposition is possible only for a symmetric matrix.
6406534218026. ✔ The singular values of a matrix are always non-negative.
6406534218027. ✔ The singular values of matrices A and A^T are the same.

Question Number : 85 Question Id : 6406531252039 Question Type : MSQ
Correct Marks : 3 Max. Selectable Options : 0
Question Label : Multiple Select Question
In the context of Linear Algebra, which of the following statements about Principal Component

Analysis (PCA) is/are true?

Options :

6406534218028. ✔ The principal components of a matrix are given by the eigenvectors of its covariance matrix.

6406534218029. ✖ The principal components of a matrix are given by the singular values of its covariance matrix.

6406534218030. ✔ PCA finds the principal components by maximizing the variance along each component.

6406534218031. ✖ The principal components form a basis that is not necessarily orthogonal.

Question Number : 86 Question Id : 6406531252040 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options is/are true?

Options :

6406534218032. ✔ $X = \{(x_1, x_2, \ldots x_n) \mid \sum_{i=1}^{n} ax_i = b\}$ is a convex set.

6406534218033. ✔ Any line in $\mathbb{R}^2$ forms a convex set.

6406534218034. ✖ Union of two convex sets is a convex set.

6406534218035. ✖ Any curve in $\mathbb{R}^2$ forms a convex set.

Question Number : 87 Question Id : 6406531252041 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options is/are true ?

Options :

6406534218036. ✖ $\cos x$ is a convex function.

6406534218037. ✔ e^x is a convex function.

6406534218038. ✔ e^{x^2+2} is a convex function.

6406534218039. ✖ If f and g both are convex, then $f \circ g$ and $g \circ f$ are convex functions.

Question Number : 88 Question Id : 6406531252042 Question Type : MSQ
Correct Marks : 3 Max. Selectable Options : 0
Question Label : Multiple Select Question

A company manufactures a commodity at two factories. The total cost of manufacturing depends on the quantities, x and y, supplied by each factory. The cost function is

$$f(x, y) = 2x^2 + xy + y^2 + 500,$$

The company's objective is to produce 200 units, while minimizing production costs. Which of the following options is/are true?

Options :

6406534218040. ✔ The cost function $f(x, y)$ is convex.

6406534218041. ✖ The optimal solution satisfies $x + y = 250$.

6406534218042. ✖ The optimal production quantity from each factory occurs when $x = y$.

6406534218043. ✔ The minimum production cost is achieved when $x = 50$ and $y = 150$.

Sub-Section Number :	5
Sub-Section Id :	640653194513
Question Shuffling Allowed :	Yes

Question Number : 89 Question Id : 6406531252043 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

Let $X_1 \sim N(2, 1)$ and $X_2 \sim \text{Poisson}(3)$ be independent random variables. What is the expectation of the compound random variable $Y = 3X_1 + 2X_2$?

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
12

Question Number : 90 Question Id : 6406531252044 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

A non-negative random variable Y has $E[Y] = 20$. Compute the Markov bound for $P(Y \geq 100)$.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0.2

Sub-Section Number :	6
Sub-Section Id :	640653194514
Question Shuffling Allowed :	Yes

Question Number : 91 Question Id : 6406531252045 Question Type : SA
Correct Marks : 4
Question Label : Short Answer Question

Find the maximum value of the function $f(x, y, z) = 5x + 7y + z$ on the curve of intersection of the plane $x + y - z = 4$ and the cylinder $x^2 + y^2 = 25$.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
46

Sub-Section Number :	7
Sub-Section Id :	640653194515
Question Shuffling Allowed :	Yes

Question Number : 92 Question Id : 6406531252046 Question Type : SA
Correct Marks : 2
Question Label : Short Answer Question

Consider the function

$$f(x, y) = x^2 + 2y^2 - 6x + 8y$$

We apply gradient descent with an initial point $(x_0, y_0) = (1, -2)$ and a learning rate of $\eta = 0.2$. Compute the updated values of x_1 and y_1 after one iteration of gradient descent, and enter the value of $x_1 + y_1$.

Response Type : Numeric
Evaluation Required For SA : Yes

Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
-0.2

Sub-Section Number :	8
Sub-Section Id :	640653194516
Question Shuffling Allowed :	No

Question Id : 6406531252047 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (93 to 95)
Question Label : Comprehension

Consider an optimization problem

$$\min\ f(x,y,z,w) = x^2 + y^2 + z^2 + w^2 + 1$$

subject to constraints:

$$x + y + z + w = 1$$

$$w \leq \delta$$

Let the Lagrangian function is,

$$L(x,\alpha,\beta) = x^2 + y^2 + z^2 + w^2 + 1 + \alpha(1 - x - y - z - w) + \beta(w - \delta)$$

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

Question Number : 93 Question Id : 6406531252048 Question Type : MSQ
Correct Marks : 2 Max. Selectable Options : 0
Question Label : Multiple Select Question
Which of the following statements correctly represent the Karush-Kuhn-Tucker (KKT) conditions for the given optimization problem?
Options :

6406534218048. ✔ $\nabla L = 0$

6406534218049. ✖ $\alpha \geq 0$

6406534218050. ✔ $\beta \geq 0$

6406534218051. ✖ $\beta(w - \delta) \leq 0$

Question Number : 94 Question Id : 6406531252049 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are correct based on the KKT conditions and the solution to the optimization problem?

Options :

6406534218052. ✔ $x = y = \frac{\alpha}{2}$

6406534218053. ✖ $z = w = \alpha$

6406534218054. ✔ $\frac{3\beta}{8} \geq \frac{1}{4} - \delta$

6406534218055. ✖ $\frac{3\beta}{8} \leq \frac{1}{4} - \delta$

Question Number : 95 Question Id : 6406531252050 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

If $\delta > \frac{1}{4}$ then find the value of x.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.25

Java

Section Id :	64065387635
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	24
Number of Questions to be attempted :	24