Consider the below javascript program.

```javascript
const a = 2;
const b = "";

const obj1 = {
    property1: 10,
    property2: 20
}

const obj2 = {
    a: 1,
    b: 2,
    ...(a && !b && { obj1 })
};

console.log(obj2);
```

What will be the output of the above program, if executed?

Options :

6406532468137. ✖ { a: 1, b: 2, property1: 10, property2: 20 }

6406532468138. ✔ { a: 1, b: 2, obj1: { property1: 10, property2: 20 } }

6406532468139. ✖ { property1: 10, property2: 20 }

6406532468140. ✖ { a: 1, b: 2 }

MLT

Section Id :	64065351360
Section Number :	12
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	11
Number of Questions to be attempted :	11
Section Marks :	50
Display Number Panel :	Yes

Section Negative Marks :	0
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 :	640653107657
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 179 Question Id : 640653737457 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 TECHNIQUES (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 :

6406532468141. ✔ YES

6406532468142. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	640653107658
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 180 Question Id : 640653737458 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

Suppose a dataset lies in $\mathbb{R}^4$ and undergoes Principal Component Analysis (PCA) after being centered. The resulting first and second principal components are given by:

$$\frac{1}{\sqrt{3}} \cdot \begin{bmatrix} 1 \\ -1 \\ 0 \\ 1 \end{bmatrix}, \quad \frac{1}{\sqrt{3}} \cdot \begin{bmatrix} 1 \\ 0 \\ 1 \\ -1 \end{bmatrix}$$

Which of the following could be the third principal component?

Options :

6406532468143. ✖ $\frac{1}{\sqrt{2}} \cdot \begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}$

6406532468144. ✖ $\frac{1}{\sqrt{3}} \cdot \begin{bmatrix} 1 \\ 1 \\ 1 \\ 0 \end{bmatrix}$

6406532468145. ✖ $\frac{1}{\sqrt{2}} \cdot \begin{bmatrix} -1 \\ -1 \\ 0 \\ 0 \end{bmatrix}$

6406532468146. ✔ $\frac{1}{\sqrt{3}} \cdot \begin{bmatrix} 0 \\ 1 \\ 1 \\ 1 \end{bmatrix}$

Question Number : 181 Question Id : 640653737462 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 $k : \mathbb{R} \times \mathbb{R} \to \mathbb{R}$ be a valid kernel. Is $\sin(x_1)\cos(x_2)k(x_1, x_2)$ a valid kernel? Here, $x_1, x_2 \in \mathbb{R}$?

Options :

6406532468149. ✖ Yes

6406532468150. ✔ No

Question Number : 182 Question Id : 640653737463 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

Consider the following kernel:
$$k : R^2 \times R^2 \to R$$
$$k(x, y) = (x^T y)^2 + 1$$

Which of the following transformation mapping ϕ may correspond to the kernel k?

Options :

6406532468151. ✔ $\phi([x_1, x_2]^T) = [x_1^2, \sqrt{2}x_1 x_2, x_2^2, 1]^T$

6406532468152. ✖ $\phi([x_1, x_2]^T) = [x_1^2, x_1 + x_2, x_2^2, 1]^T$

6406532468153. ✖ $\phi([x_1, x_2]^T) = [x_1, \sqrt{2}x_1^2 x_2^2, x_2, 1]^T$

6406532468154. ✖ $\phi([x_1, x_2]^T) = [x_1, x_1 x_2, x_2, 1]^T$

Question Number : 183 Question Id : 640653737464 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

Consider a dataset consisting of 1000 samples in a 20-dimensional space. You apply Kernel PCA with a polynomial kernel of degree 3 to reduce the dimensionality of the data. Which of the following statements regarding Kernel PCA is true?

Options :

6406532468155. ✽ Kernel PCA always results in a lower-dimensional representation of the data compared to standard PCA.

6406532468156. ✽ Kernel PCA can only be applied to datasets that are linearly separable.

6406532468157. ✔ Choosing a higher degree polynomial kernel in Kernel PCA can lead to increased flexibility in capturing non-linear relationships.

6406532468158. ✽ None of these.

Sub-Section Number :	3
Sub-Section Id :	640653107659
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653737459 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 : (184 to 185)

Question Label : Comprehension

Standard PCA has been performed on a centered dataset in $\mathbb{R}^3$. The first two principal components are given below:

$$\mathbf{w}_1 = \frac{1}{\sqrt{3}} \cdot \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \quad \mathbf{w}_2 = \frac{1}{\sqrt{2}} \cdot \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$$

Consider the data point in the dataset: $\begin{bmatrix} 2 & 1 & -1 \end{bmatrix}^T$. (a, b) is the representation of this point in the coordinate system formed by the two principal components given above. The first and second coordinates correspond to PC-1 and PC-2 respectively.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 184 Question Id : 640653737460 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 a? Enter your answer correctly to three decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1.10 to 1.20

Question Number : 185 Question Id : 640653737461 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 b? Enter your answer correctly to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.65 to 0.75

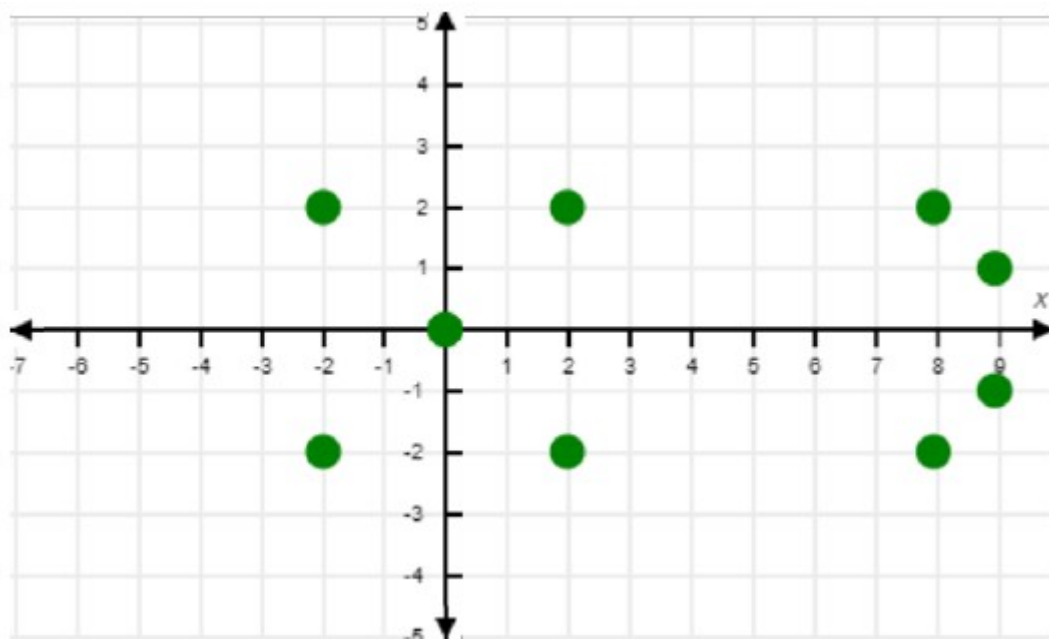**Question Id : 640653737466 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

Question Numbers : (186 to 187)

Question Label : Comprehension

Consider the data points shown in the following image:

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 186 Question Id : 640653737467 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

Perform K-means clustering with $K = 2$ and initial cluster centers at (0, 0) and (6, 0). What are the final means of clusters after convergence?

Options :

6406532468163. ✸ (2, 0) and (8, 0)

6406532468164. ✸ (2, 0) and (8.5, 0)

6406532468165. ✸ (0, 0) and (8, 0)

6406532468166. ✔ (0, 0) and (8.5, 0)

6406532468167. ✸ None of these

Question Number : 187 Question Id : 640653737468 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

After introducing a new data point (7, 0) , the cluster centers were updated. Enter the sum of the updated x-coordinates for both cluster centers accurately, rounding your answer to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

8.18 to 8.22

Sub-Section Number :	4
Sub-Section Id :	640653107660
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653737470 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 : (188 to 189)

Question Label : Comprehension

Assume that you have a dataset of six points $\{x_1, x_2, x_3, x_4, x_5, x_6\}$, all of which are non-negative. You hypothesise that the data points are iid random variables with the following density:

$$f(x; \lambda) = \begin{cases} \lambda e^{-\lambda x}, & x \geq 0 \\ 0, & x < 0 \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 188 Question Id : 640653737471 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

What is the log-likelihood of this dataset under this distribution? ln represents the natural logarithm or $\log_e$.

Options :

6406532468170. ✖ $\displaystyle\prod_{i=1}^{6} \lambda e^{-\lambda x_i}$

6406532468171. ✖ $\displaystyle\sum_{i=1}^{6} \lambda e^{-\lambda x_i}$

6406532468172. ✖ $\displaystyle\prod_{i=1}^{6} [\ln(\lambda) - \lambda x_i]$

6406532468173. ✔

$$\sum_{i=1}^{6} \left[\ln(\lambda) - \lambda x_i \right]$$

Question Number : 189 Question Id : 640653737472 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

You are given the actual values of these observations:

$x_1 = 1, \quad x_2 = 2, \quad x_3 = 3, \quad x_4 = 4, \quad x_5 = 5, \quad x_6 = 6$

What is the maximum likelihood estimate for λ? Enter your answer correct to three decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.25 to 0.35

Sub-Section Number :	5
Sub-Section Id :	640653107661
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 190 Question Id : 640653737465 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider Lloyd's algorithm used for k-means clustering and choose the correct statements:

Question Number : 191 Question Id : 640653737473 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

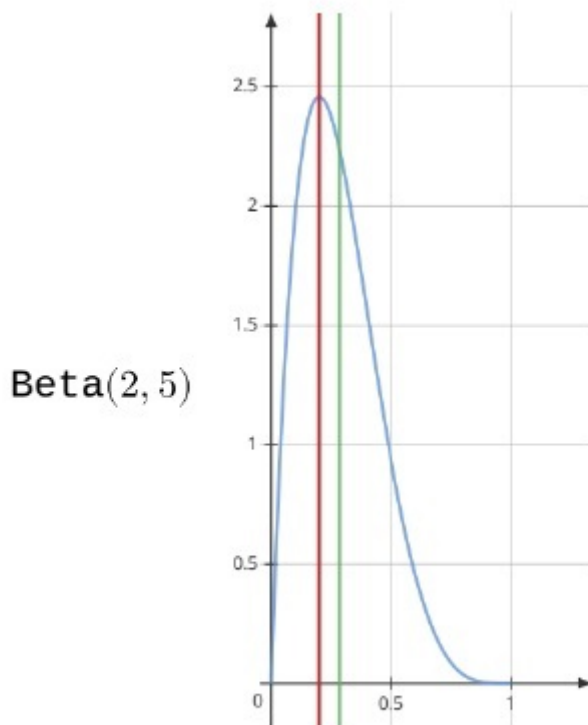For the given Beta distribution, choose the correct option.

Figure 1: Beta(2,5)

Options :

6406532468175. ✖ Red line denotes the mean for the given Beta distribution, i.e. mean $= \dfrac{2}{7}$

6406532468176. ✔ Green line denotes the mean for the given Beta distribution, i.e. mean $= \frac{2}{7}$

6406532468177. ✔ Red line denotes the mode for the given Beta distribution, i.e. mode $= \frac{1}{5}$

6406532468178. ✖ Green line denotes the mode for the given Beta distribution, i.e. mode $= \frac{1}{5}$

Sub-Section Number :	6
Sub-Section Id :	640653107662
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 192 Question Id : 640653737469 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

Consider a dataset with 100 total data points. Each data point is classified as either type A or type B. We model this using a Bernoulli distribution, where p is the probability of a data point being type A. If the maximum likelihood estimate (MLE) of p based on the dataset is 0.4, how many data points of type B are there in this dataset?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

60

MLP

Section Id :	64065351361
Section Number :	13
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	21
Number of Questions to be attempted :	21
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
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 :	640653107663
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 193 Question Id : 640653737474 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

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