

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following JavaScript Code.

```
class Person {  
  constructor(name) {  
    this.name = name;  
  }  
  
  greet() {  
    console.log(`Hello, my name is ${this.name}`);  
  }  
  
  static identify() {  
    console.log("I am a Person class");  
  }  
}  
  
const john = new Person("John");
```

Which of the following expression(s) will cause an error?

Options :

6406533775353. ✖ john.greet();

6406533775354. ✔ Person.greet();

6406533775355. ✔ john.identify();

6406533775356. ✖ Person.identify();

6406533775357. ✖ console.log(john.name);

MLT

Section Id :	64065379144
Section Number :	9
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 :	640653168635
Question Shuffling Allowed :	No

Question Number : 131 Question Id : 6406531114166 Question Type : MCQ

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 :

6406533775375.  YES

6406533775376.  NO

Sub-Section Number :	2
Sub-Section Id :	640653168636
Question Shuffling Allowed :	Yes

Question Number : 132 Question Id : 6406531114167 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

For the Lloyd's algorithm, what would be the correct relationship among the following three quantities?

(1) $\sum_{i=1}^n \|x_i - \mu_{z_i^{t+1}}^t\|^2,$

(2) $\sum_{i=1}^n \|x_i - \mu_{z_i^t}^t\|^2,$

(3) $\sum_{i=1}^n \|x_i - \mu_{z_i^{t+1}}^{t+1}\|^2$

where $\mu_{z_i^t}^t$ and $\mu_{z_i^{t+1}}^{t+1}$ refer to means of cluster z_i in iterations, t and $t+1$ respectively, and $\mu_{z_i^{t+1}}^t$ refer to the mean of the cluster z_i where x_i is going to move in the next iteration, i.e., $(t+1)$ -th iteration.

Options :

6406533775377. ✖ (1) > (2) > (3)

6406533775378. ✖ (1) < (2) < (3)

6406533775379. ✔ (3) < (1) < (2)

6406533775380. ✖ (2) < (3) < (1)

Sub-Section Number :

3

Sub-Section Id :

640653168637

Question Shuffling Allowed :

Yes

Question Number : 133 Question Id : 6406531114168 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

K -means clustering is run on a dataset of 100 points with $K = 3$. If you know that the points $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ are a part of the same cluster $C1$, then which of the following points will definitely lie in $C1$?

Options :

6406533775381. ✖ $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$

6406533775382. ✖ $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$

6406533775383. ✔ $\begin{bmatrix} 0.2 \\ 1 \end{bmatrix}$

6406533775384. ✖ $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$

Question Number : 134 Question Id : 6406531114169 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Let x_1, x_2, \dots, x_n be d -dimensional data points ($d > n$) and X be the matrix of shape $d \times n$ containing the data points. The k^{th} largest eigenvalue and corresponding unit eigenvector of $X^T X$ is λ and α_k , respectively. What will be the projection of x_i on the k^{th} principal component?

Options :

6406533775385. ✖ $x_i^T \alpha_k$

6406533775386. ✖ $\frac{x_i^T \alpha_k}{\sqrt{n\lambda}}$

6406533775387. ✔ $\frac{x_i^T X \alpha_k}{\sqrt{\lambda}}$

6406533775388. ✖ $x_i^T X \alpha_k$

Sub-Section Number :

4

Sub-Section Id :

640653168638

Question Shuffling Allowed :

Yes

Question Number : 135 Question Id : 6406531114170 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following matrices are appropriate matrix $K = X^T X$ for some data matrix X ? Choose the most appropriate answer.

Options :

6406533775389. ✔ $K = \begin{bmatrix} 4 & 1 & 2 \\ 1 & 5 & 3 \\ 2 & 3 & 6 \end{bmatrix}$

6406533775390. ✖ $K = \begin{bmatrix} -2 & -1 & 0 \\ -1 & -3 & -1 \\ 0 & -1 & -1 \end{bmatrix}$

6406533775391. ✖

$$K = \begin{bmatrix} 1 & -2 & 1 \\ 2 & 5 & -2 \\ 1 & -2 & 2 \end{bmatrix}$$

$$K = \begin{bmatrix} 3 & 1 & 0 \\ 1 & 4 & 1 \\ 0 & 1 & 5 \end{bmatrix}$$

6406533775392. ✓

Sub-Section Number :

5

Sub-Section Id :

640653168639

Question Shuffling Allowed :

Yes

Question Number : 136 Question Id : 6406531114171 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is/are true?

Options :

6406533775393. ✓ $k : \mathbb{R}^2 \times \mathbb{R}^2 \rightarrow \mathbb{R}, k(x_1, x_2) = (x_1^T x_2)^3$ is a valid kernel.

6406533775394. ✓ $k : \mathbb{R}^n \times \mathbb{R}^n \rightarrow \mathbb{R}, k(x_1, x_2) = e^{-\|x_1 - x_2\|^2}$ is a valid kernel.

6406533775395. ✓ The trace of XX^T is equal to the trace of $X^T X$.

6406533775396. ✗ Eigenvectors of XX^T are the same as eigenvectors of $X^T X$.

Sub-Section Number :

6

Sub-Section Id :

640653168640

Question Shuffling Allowed :

Yes

Question Number : 137 Question Id : 6406531114172 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Let X be a data matrix of shape (d, n) for a centered dataset. The first principal component of the dataset is given as

$$\left[\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right]^T.$$

What will be the scalar proxy of the point $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$ onto the first principal component?

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 :

4.92 to 4.98

Question Number : 138 Question Id : 6406531114173 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider a dataset that has 1000 samples, where each sample belongs to \mathbb{R}^{20} . PCA is run on this dataset and the top 5 principal components are retained, the rest being discarded. If it takes one unit of memory to store a real number, find the percentage decrease in storage space of the dataset by moving to its compressed representation. Enter your 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 :

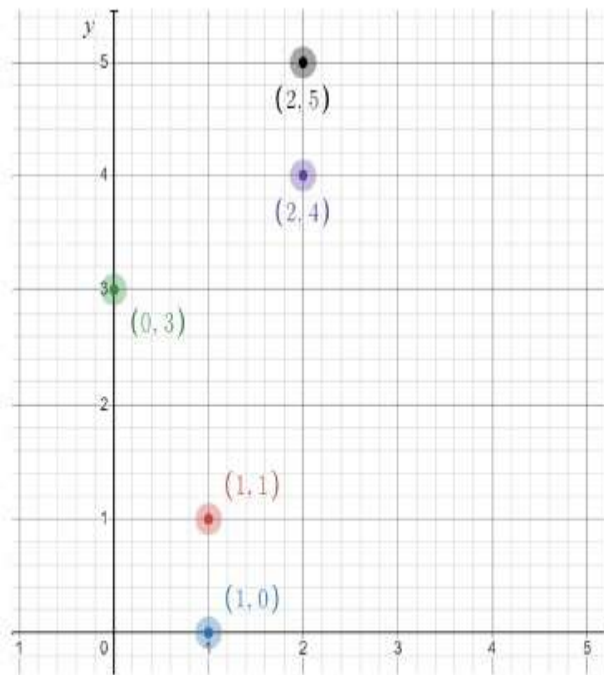
74 to 75

Question Number : 139 Question Id : 6406531114174 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

K -means++ algorithm was run on the following dataset with $K = 2$. If we



use the point $(1, 1)$ as the first cluster mean, then find the probability of the point that has the least chance of being chosen as the second cluster mean. Enter the answer correct to two decimal places. Use Euclidean distance to calculate the distance.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.07 to 0.11

Question Number : 140 **Question Id :** 6406531114175 **Question Type :** SA

Correct Marks : 3

Question Label : Short Answer Question

Suppose you toss a coin four times and observe no heads. You then give the coin to your friend, who tosses it until the first head occurs. Your friend tosses the coin a total of five times. Let p denote the probability that the coin comes up heads. Find the maximum likelihood estimate of p .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.10 to 0.12

Sub-Section Number :

7

Sub-Section Id :

640653168641

Question Shuffling Allowed :

Yes

Question Number : 141 Question Id : 6406531114176 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Suppose we fit a Gaussian Mixture Model with $K = 2$ for the following dataset:

$$D = \{x_1 = 1, x_2 = 3, x_3 = 2, x_4 = 5\}.$$

At the beginning of the t -th time step of the EM algorithm, we have $\theta^{(t)}$ as follows:

$$\pi_1 = 0.5, \quad \pi_2 = 0.5$$

$$\mu_1 = 1, \quad \mu_2 = 3$$

$$\sigma_1^2 = 1, \quad \sigma_2^2 = 1$$

What is the probability that x_1 belongs to the first component? 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 :

0.86 to 0.90

Sub-Section Number :

8

Sub-Section Id :

640653168642

Question Shuffling Allowed :

No

Question Id : 6406531114177 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (142 to 143)

Question Label : Comprehension

Consider the following dataset consisting of four points, all of which are collinear:

$$S = \left\{ \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 3 \\ 6 \end{bmatrix}, \begin{bmatrix} 5 \\ 10 \end{bmatrix} \right\}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 142 Question Id : 6406531114178 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Among the vectors given below, choose a representative that has unit length.

Options :

6406533775402. ✖ $\begin{bmatrix} 1 \\ \frac{3}{2} \\ \frac{3}{2} \\ 3 \end{bmatrix}$

6406533775403. ✔ $\begin{bmatrix} 1 \\ \frac{\sqrt{5}}{2} \\ \frac{\sqrt{5}}{2} \\ \sqrt{5} \end{bmatrix}$

6406533775404. ✖ $\begin{bmatrix} 3 \\ \frac{\sqrt{5}}{6} \\ \frac{\sqrt{5}}{6} \\ \sqrt{5} \end{bmatrix}$

6406533775405. ✖ $\begin{bmatrix} 3 \\ \frac{5}{4} \\ \frac{5}{4} \\ 5 \end{bmatrix}$

Question Number : 143 Question Id : 6406531114179 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

If standard PCA is performed on this dataset, what is the variance along the first principal component? 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 :

43 to 44

Sub-Section Number :

9

Sub-Section Id :

640653168643

Question Shuffling Allowed :

No

Question Id : 6406531114180 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (144 to 145)

Question Label : Comprehension

Suppose that 100 items are sampled from a manufacturing process and 10 are found to be defective. Let p denote the proportion of defective items. Assume that the prior distribution for p is Beta(1, 1).

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 144 Question Id : 6406531114181 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Select the correct options from the following:

Options :

- 6406533775407. ✖ Posterior distribution for p is Beta(91, 11).
- 6406533775408. ✔ Posterior distribution for p is Beta(11, 91).
- 6406533775409. ✖ Posterior distribution for p is Bernoulli(0.1).
- 6406533775410. ✖ Posterior distribution for p is Bernoulli(0.9).

Question Number : 145 Question Id : 6406531114182 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the posterior mean. 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 :

0.10 to 0.11

MLP

Section Id :	64065379145
Section Number :	10
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