

Options :

6406531929885. ✘ hello

6406531929886. ✘ HELLO

6406531929887. ✔ OLLEH

6406531929888. ✘ olleh

MLT

Section Id :	64065339076
Section Number :	11
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	13
Number of Questions to be attempted :	13
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 :	64065382611
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 168 Question Id : 640653577921 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 :

6406531929889. ✓ YES

6406531929890. ✘ NO

Sub-Section Number :	2
Sub-Section Id :	64065382612
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 169 Question Id : 640653577922 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 function:

$$k : \mathbb{R}^2 \times \mathbb{R}^2 \rightarrow \mathbb{R}$$

$$k([x_1, x_2]^T, [y_1, y_2]^T) = 1 + x_1y_1 + x_2y_2 + x_1^2y_1^2x_2y_2 + x_1y_1x_2^2y_2^2$$

Find the appropriate transformation mapping ϕ for the given kernel.

Options :

6406531929891. ✘ $\phi([x_1, x_2]^T) = [1, x_1x_2, x_1^2x_2^2]$

6406531929892. ✘ $\phi([x_1, x_2]^T) = [1, x_1, x_2, x_1^2x_2^2]$

6406531929893. ✔ $\phi([x_1, x_2]^T) = [1, x_1, x_2, x_1^2x_2, x_1x_2^2]$

6406531929894. ✘ $\phi([x_1, x_2]^T) = [1, x_1, x_2, x_1x_2, x_1^2x_2^2]$

Question Number : 170 Question Id : 640653577923 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 Hard K-means clustering problem with four points:

$P(1, 1), Q(2, 1), R(4, 3),$ and $S(5, 4)$. Consider the number of clusters to be $k = 2$ and the initial centroids to be $C_1 = (0, 0)$ and $C_2 = (4, 4)$. After how many iterations will the algorithm terminate and what will be the final centroids? use euclidean distance metric to calculate distance.

Options :

6406531929895. ✘ 2, (1, 1), (4, 4)

6406531929896. ✘ 3, (1, 1), (4, 4)

6406531929897. ✔ 2, (1.5, 1), (4.5, 3.5)

6406531929898. ✘ 4, (1.5, 1), (4.5, 3.5)

Sub-Section Id : 64065382613

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 171 Question Id : 640653577924 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Select all true statements regarding standard PCA applied on a centered dataset.

Options :

6406531929899. ✓ The variance of the dataset along the first principal component is maximum.

6406531929900. ✘ The variance of the dataset along the first principal component is minimum.

6406531929901. ✓ The first principal component is the unit norm eigenvector corresponding to the largest eigenvalue of the covariance matrix.

6406531929902. ✘ The first principal component is the unit norm eigenvector corresponding to the smallest eigenvalue of the covariance matrix.

Question Number : 172 Question Id : 640653577925 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider a dataset of 2000 points all of which lie in \mathbb{R}^{30} . If all these points lie in four dimensional low subspace then after applying the PCA algorithm which of the following statements is/are true?

Options :

6406531929903. ✘ The covariance matrix corresponding to this dataset has 30 non-zero eigenvalues.

6406531929904. ✓ The covariance matrix corresponding to this dataset has only four non-zero eigenvalues.

6406531929905. ✓ The residues will become zero after four rounds

6406531929906. ✓ By utilizing four principal component vectors and their corresponding coefficients, we have the ability to reconstruct the complete dataset using representatives.

Sub-Section Number : 4
Sub-Section Id : 64065382614
Question Shuffling Allowed : Yes
Is Section Default? : null

Question Number : 173 Question Id : 640653577926 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

Which of the following statements about kernel PCA is/are always true?

Options :

6406531929907. ✘ The number of principal components corresponding to nonzero eigenvalues obtained using kernel PCA on d dimensional dataset cannot be more than d .

6406531929908. ✓ For every transformation mapping $\phi : \mathbb{R}^d \rightarrow \mathbb{R}^D$, there exists a valid kernel function.

6406531929909. ✓ For two valid kernels $k_1, k_2 : \mathbb{R}^d \times \mathbb{R}^d \rightarrow \mathbb{R}$, $ak_1 + bk_2$ is a valid kernel function. Here both a and b are positive real numbers.

6406531929910. ✘ The output of a valid kernel function can never be a negative real number.

Question Number : 174 Question Id : 640653577928 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

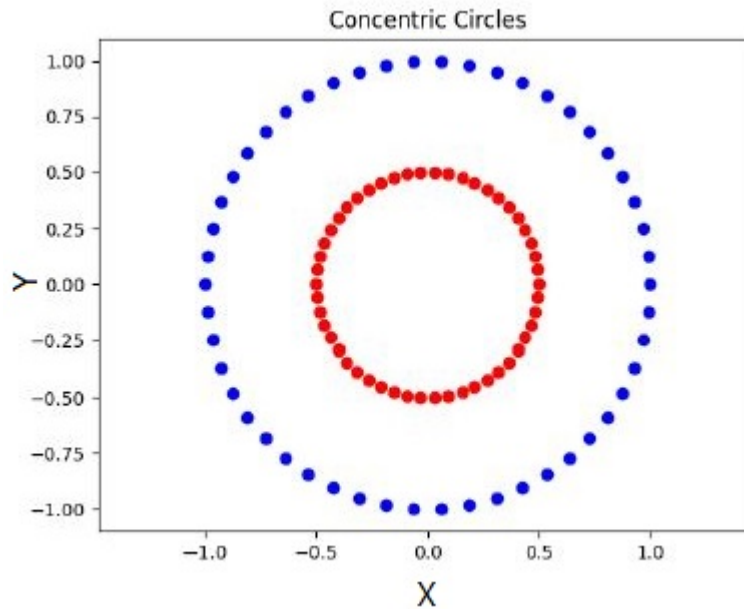
Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

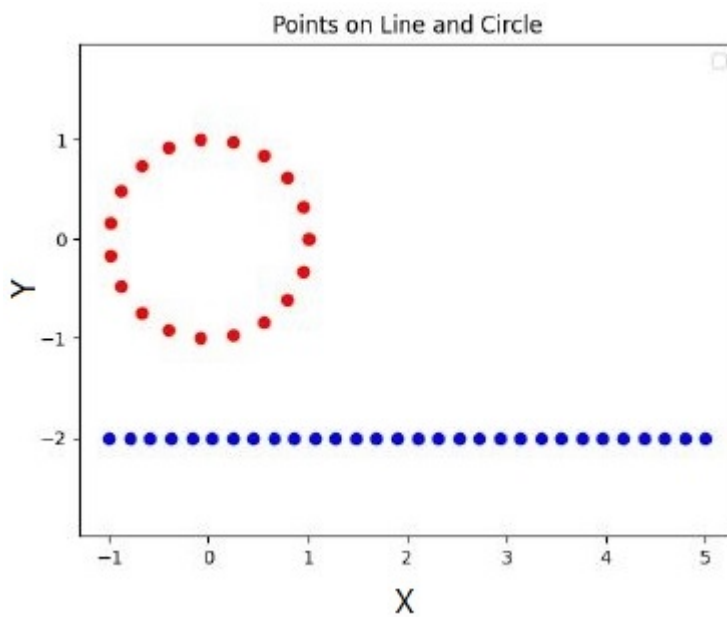
Which of the following clusters cannot be obtained as final clusters using Lloyd's algorithm?

Assume that Lloyd's algorithm was run on these datasets with $k = 2$.

Options :

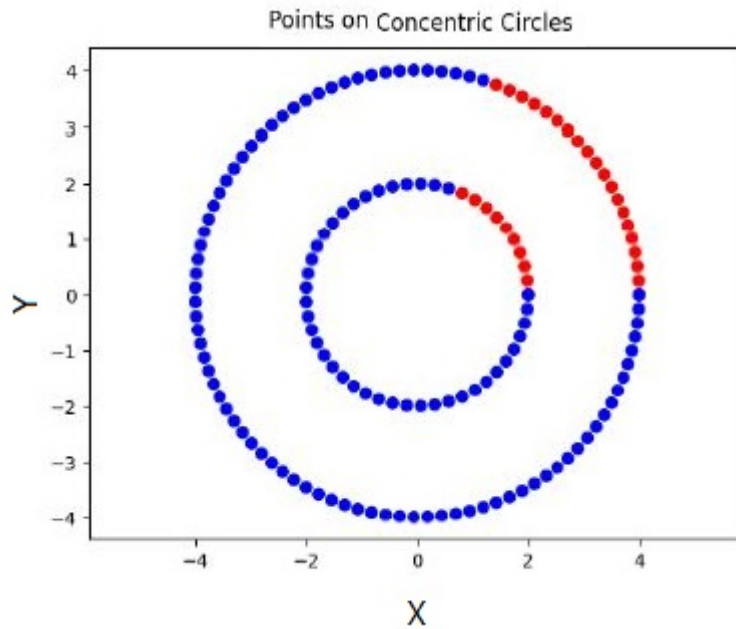
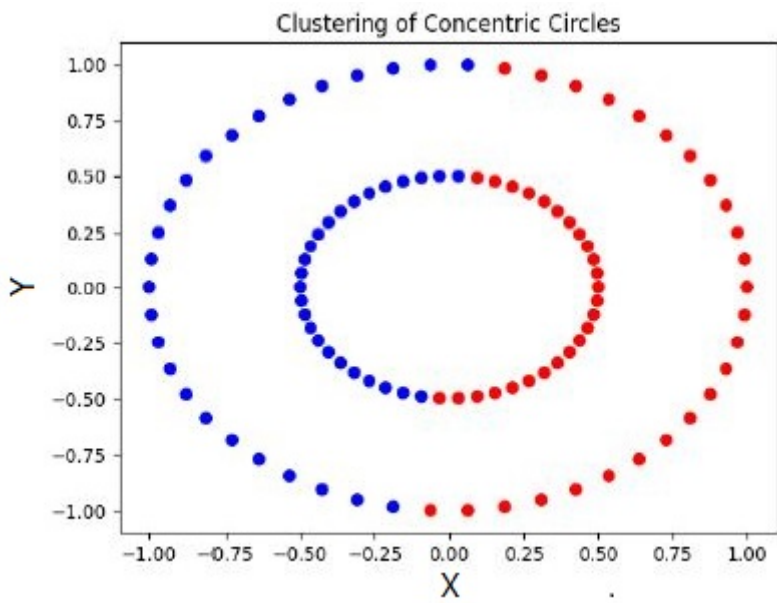


6406531929915. ✓



6406531929916. ✓

6406531929917. ✘



6406531929918. ✓

Sub-Section Number : 5
 Sub-Section Id : 64065382615
 Question Shuffling Allowed : Yes
 Is Section Default? : null

Question Number : 175 Question Id : 640653577927 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0
 Correct Marks : 3.5 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is/are true?

Options :

6406531929911. ✓ $k : \mathbb{R}^2 \times \mathbb{R}^2 \rightarrow \mathbb{R}, k(x_1, x_2) = (x_1^T x_2)^3$ is a valid kernel.

6406531929912. ✘ $k : \mathbb{R}^2 \times \mathbb{R}^2 \rightarrow \mathbb{R}, k(x_1, x_2) = -(x_1^T x_2)^3$ is a valid kernel.

6406531929913. ✓ nonzero Eigenvalues of XX^T and $X^T X$ are the same.

6406531929914. ✘ Eigenvectors of XX^T are same as eigenvectors of $X^T X$.

Sub-Section Number : 6
Sub-Section Id : 64065382616
Question Shuffling Allowed : Yes
Is Section Default? : null

Question Number : 176 Question Id : 640653577929 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 the following dataset in \mathbb{R} :

$\{-3, -1, 0, 1, 4, 299, 300, 301\}$

Lloyd's algorithm ($K = 2$) is run on this dataset with the points -10 and 310 as the initial cluster centers. Let a, b be the final cluster centers on convergence, what is the value of the product ab ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

60

Question Number : 177 Question Id : 640653577930 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 that has 100 data-points, each of which is either a zero or one. The Bernoulli distribution is used to model this data. If the MLE estimate for the parameter p of the Bernoulli distribution is 0.3, how many zeros does the dataset have?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

70

Question Number : 178 Question Id : 640653577932 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 60 points in which all points are either 0 or 1. We use a Bernoulli distribution with the parameter p to model this problem. The prior and posterior distributions for the parameter p are Beta(10,5) and Beta(30,45) respectively. How many data points have the value 0 in this dataset? Note that $p = P(x = 1)$ as usual.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

40

Sub-Section Number :

7

Sub-Section Id :

64065382617

Question Shuffling Allowed :

Yes

Is Section Default? :

null

Question Number : 179 Question Id : 640653577931 Question Type : SA Calculator : None

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

Correct Marks : 4.5

Question Label : Short Answer Question

Consider a GMM with two components:

$$\pi_1 = 0.3, \quad \pi_2 = 0.7$$

$$\mu_1 = 0, \quad \sigma_1^2 = 1$$

$$\mu_2 = 1, \quad \sigma_2^2 = 2$$

What is the probability that the point $x = 1.2$ comes from the first component? Use the following table for your reference. Here, $\mathcal{N}(x, \mu, \sigma^2)$ is the density of the Gaussian with mean μ and variance σ^2 evaluated at x .

μ	σ^2	$\mathcal{N}(1.2, \mu, \sigma^2)$
0	1	0.194
0	2	0.197
1	1	0.391
1	2	0.279

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 :

0.15 to 0.35

Sub-Section Number : 8

Sub-Section Id : 64065382618

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653577933 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 : (180 to 181)

Question Label : Comprehension

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

$$\mathbf{w}_1 = \frac{1}{\sqrt{5}} \cdot \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}, \quad \mathbf{w}_2 = \frac{1}{\sqrt{6}} \cdot \begin{bmatrix} -2 \\ 1 \\ 1 \end{bmatrix}$$

Consider the following data-point in the dataset:

$[1 \ 2 \ 1]^T$. (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 : 180 Question Id : 640653577934 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

What is the value of a ? 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 :

1.25 to 1.5

Question Number : 181 **Question Id :** 640653577935 **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

What is the value of b ? 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 :

0.25 to 0.55

MLP

Section Id :	64065339077
Section Number :	12
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	25
Number of Questions to be attempted :	25
Section Marks :	50