Change Theme :	No
Help Button :	No
Show Reports :	No
Show Progress Bar :	No

Group I

Group Number :	1
Group Id :	6406538807
Group Maximum Duration :	0
Group Minimum Duration :	90
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	655
Is this Group for Examiner? :	No
Examiner permission :	Cant View
Show Progress Bar? :	No
Revisit allowed for group Instructions? :	Yes
Maximum Instruction Time :	0
Minimum Instruction Time :	0
Group Time In :	Minutes
Navigate To Group Summary From Last Question? :	No
Disable Submit Button During Assessment? :	No

Maths 2

Section Id :	64065322131
Section Number :	1

Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	8
Number of Questions to be attempted :	8
Section Marks :	25
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 :	64065350356
Question Shuffling Allowed :	No

Question Number : 1 Question Id : 640653351212 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 "MATHEMATICS FOR DATA SCIENCE 2"

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 :

6406531165732. ✔ Yes

6406531165733. ✖ No

Sub-Section Number :	2
Sub-Section Id :	64065350357
Question Shuffling Allowed :	Yes

Question Number : 2 Question Id : 640653351213 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Select Question

Choose the correct options.

Options :

6406531165734. ✔ The row reduced echelon form of an $n \times n$ orthogonal matrix is the identity matrix of order n.

6406531165735. ✔ Suppose that A is a non-zero $m \times n$ matrix such that the vectors in $\mathbb{R}^m$ corresponding to the columns of A are mutually orthonormal with respect to the usual inner product of $\mathbb{R}^m$. Then $A^T A = I$, where I is the identity matrix of order n.

6406531165736. ✖ The trace of an $n \times n$ orthogonal matrix is 0.

6406531165737. ✖ Suppose A is a non-zero $m \times n$ matrix such that the vectors in $\mathbb{R}^m$ corresponding to the columns of A are mutually orthogonal with respect to the usual inner product of $\mathbb{R}^m$. Then AA^T is a diagonal matrix of order m.

Question Number : 3 Question Id : 640653351222 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Select Question

An inner product on a vector space V is a function $\langle \cdot, \cdot \rangle : V \times V \to \mathbb{R}$ satisfying the following conditions:

Condition 1: $\langle v, v \rangle > 0$ for all $v \in V \setminus \{0\}$; $\langle v, v \rangle = 0$ if and only if $v = 0$.

Condition 2: $\langle v_1 + v_2, v_3 \rangle = \langle v_1, v_3 \rangle + \langle v_2, v_3 \rangle$.

Condition 3: $\langle v_1, v_2 \rangle = \langle v_2, v_1 \rangle$.

Condition 4: $\langle cv_1, v_2 \rangle = c \langle v_1, v_2 \rangle$

Let $V = \mathbb{R}^2$ and consider the function defined as:

$$\langle \cdot, \cdot \rangle : V \times V \to \mathbb{R}$$
$$\langle (x_1, x_2), (y_1, y_2) \rangle = x_1 y_1 - x_1 y_2 - x_2 y_1 + x_2 y_2.$$

Which of the following are satisfied by the above function?

Options :

6406531165748. ✸ Condition 1 is satisfied.

6406531165749. ✔ Condition 2 is satisfied.

6406531165750. ✔ Condition 3 is satisfied.

6406531165751. ✔ Condition 4 is satisfied.

Question Number : 4 Question Id : 640653351224 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Select Question

Let U be a subspace of the vector space $\mathbb{R}^3$ and suppose $\{(1, 0, 1), (0, 1, 2)\}$ is a basis of U. Then which of the following subsets of $\mathbb{R}^3$ are appropriate candidates for the affine subspaces of $\mathbb{R}^3$ such that the corresponding vector subspace is U?

Options :

6406531165756. ✸ $\{(x, y, z) \mid x + 2y + z = 2, x, y, z \in \mathbb{R}\}$

6406531165757. ✸ $\{(x, y, z) \mid x + 2y + z = 1, x, y, z \in \mathbb{R}\}$

6406531165758. ✸ $\{(x, y, z) \mid x - 2y - z = 0, x, y, z \in \mathbb{R}\}$

6406531165759. ✸ $\{(x, y, z) \mid x - 2y - z = 1, x, y, z \in \mathbb{R}\}$

6406531165760. ✔ $\{(x, y, z) \mid x + 2y - z = 2, x, y, z \in \mathbb{R}\}$

6406531165761. ✔ $\{(x, y, z) \mid x + 2y - z = 0, x, y, z \in \mathbb{R}\}$

Sub-Section Number :	3
Sub-Section Id :	64065350358
Question Shuffling Allowed :	Yes

Question Number : 5 Question Id : 640653351221 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

Let us consider the following matrices:

$$A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}, C = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Consider the following pairs of matrices :

- Pair I: A, B
- Pair II: A, C
- Pair III: B, C

Choose the correct option from the following.

Options :

6406531165744. ✔ Only the matrices in Pair I are similar matrices.

6406531165745. ✖ All the pairs consist of similar matrices.

6406531165746. ✖ Only the matrices in Pair III are similar matrices.

6406531165747. ✖ None of these pairs consist of similar matrices.

Sub-Section Number :	4
Sub-Section Id :	64065350359
Question Shuffling Allowed :	Yes

Question Number : 6 Question Id : 640653351223 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Select Question

A norm on a vector space V is a function

$$\| \cdot \| : V \to \mathbb{R}$$

$$x \mapsto \|x\|$$

satisfying the following conditions:

Condition 1: $\|x + y\| \le \|x\| + \|y\|$ for all $x, y \in V$.

Condition 2: $\|cx\| = |c|\|x\|$ for all $c \in \mathbb{R}$ and for all $x \in V$.

Condition 3: $\|x\| \ge 0$ for all $x \in V$; $\|x\|=0$ if and only if $x = 0$.

Consider a function $\| \cdot \| : \mathbb{R}^3 \to \mathbb{R}$ defined as

$$\|(x_1, x_2, x_3)\| = |x_1 + x_2 + x_3|$$

on the vector space $\mathbb{R}^3$.
Which of the following are satisfied by the above function?

Options :

6406531165752. ✔ Condition 1 is satisfied.

6406531165753. ✔ Condition 2 is satisfied.

6406531165754. ✖ Condition 3 is satisfied.

6406531165755. ✖ None of these conditions are satisfied.

Sub-Section Number :	5
Sub-Section Id :	64065350360
Question Shuffling Allowed :	No

Question Id : 640653351214 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (7 to 12)

Question Label : Comprehension

Let T be a linear transformation from $\mathbb{R}^3$ to $\mathbb{R}^2$ defined as $T(x, y, z) = (x + y - z, y + z)$. Let A be the matrix representation of T with respect to the basis $\beta = \{(1, 1, 0), (0, 1, 1), (1, 0, 1)\}$ for the domain and the basis $\gamma = \{(1, 1), (1, 0)\}$ for the codomain.

$$A = \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix}$$

Let $S = \{(x, y, z) \mid x = mz, y = nz; x, y, z \in \mathbb{R}\}$ be the nullspace of the T. Answer the subquestions based on the given data.

Sub questions

Question Number : 7 Question Id : 640653351215 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

What is the value of $d - a$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Question Number : 8 Question Id : 640653351216 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

What is the value of $e - b$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-4

Question Number : 9 Question Id : 640653351217 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

What is the value of $f - c$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-2

Question Number : 10 Question Id : 640653351218 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

What is the value of m?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 11 Question Id : 640653351219 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

What is the value of *n*?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-1

Question Number : 12 Question Id : 640653351220 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

Find out the nullity of *T*.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Sub-Section Number :	6
Sub-Section Id :	64065350361
Question Shuffling Allowed :	No

Question Numbers : (13 to 22)

Question Label : Comprehension

Suppose two publication houses (publication house A and publication house B) have organized a sale of their books. Both of them publish three types of books: novels, poetry collections and collections of short stories. The selling price (in (hundreds) ₹) of these three types of books in publication houses A and B are given as follows:

	Novels	Poetry collections	Collections of short stories
Publication house A	1	2	5
Publication house B	3	3	3

Table: Q2M2T1

The publication houses announced that in order to avail these special sale prices, customers have to buy equal number of novels, equal number of poetry collection, and equal number of collection of short stories from each of the publication houses (i.e., if a customer buys x number of novels, y number of poetry collections and z number of collection of short stories from Publication house A; then they have to buy exactly x number of novels, y number of poetry collections and z number of collection of short stories from Publication house B, to avail the benefit of the sale). So there is a map taking the tuple consisting of the number of books of each type bought (Novels, Poetry collections, Collection of short stories) to the prices paid by customers who availed the sale to each of the publication houses, which yields a linear transformation (T) from $\mathbb{R}^3$ to $\mathbb{R}^2$ (where the first and second co-ordinates of the image denotes the prices paid to publication house A and publication house B, respectively).
Answer the **subquestions** using the above information.

Sub questions

Question Number : 13 Question Id : 640653351226 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

If A is the matrix representation of T with respect to the basis

$\{(1,0,0),(0,1,0),(0,0,1)\}$

for $\mathbb{R}^3$ and to the basis $\{(1,0),(0,1)\}$ for $\mathbb{R}^2$, then A is

Options :

6406531165762. ✖ $\begin{bmatrix} 1 & 3 \\ 2 & 3 \\ 5 & 3 \end{bmatrix}$

6406531165763. ✔ $\begin{bmatrix} 1 & 2 & 5 \\ 3 & 3 & 3 \end{bmatrix}$

6406531165764. ✖ $\begin{bmatrix} 1 & 3 & 5 \\ 2 & 3 & 3 \end{bmatrix}$

6406531165765. ✖ $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

Question Number : 14 Question Id : 640653351227 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

We apply the sequence of row operations on A, as follows:

- Step 1: $R_2 - 3R_1$
- Step 2: $-\frac{1}{3}R_2$
- Step 3: $R_1 - 2R_2$

Applying this row operations in the given order, the matrix B is derived. Let

$$B = \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix}$$

What is the value of a ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 15 Question Id : 640653351228 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

We apply the sequence of row operations on A, as follows:

- Step 1: $R_2 - 3R_1$
- Step 2: $-\frac{1}{3}R_2$
- Step 3: $R_1 - 2R_2$

Applying this row operations in the given order, the matrix B is derived. Let

$$B = \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix}$$

What is the value of d ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Question Number : 16 Question Id : 640653351229 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

We apply the sequence of row operations on A, as follows:

- Step 1: $R_2 - 3R_1$
- Step 2: $-\frac{1}{3}R_2$
- Step 3: $R_1 - 2R_2$

Applying this row operations in the given order, the matrix B is derived. Let

$$B = \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix}$$

What is the value of c ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-3

Question Number : 17 Question Id : 640653351230 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

If $\{(l, m, n)\}$ is a basis of $ker(T)$, then

Find the value of l if n is 1.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 18 Question Id : 640653351231 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

If $\{(l, m, n)\}$ is a basis of $ker(T)$, then

Find the value of m if n is 1.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-4

Question Number : 19 Question Id : 640653351232 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

Let $\beta = \{v_1, v_2\}$ be the orthonormal basis of the row space obtained by using the GramSchmidt process (with respect to usual inner product) applied on the ordered basis of the row space given by the first row and the second row of the matrix A. If

$$v_2 = \frac{1}{\sqrt{195}}(b, c, d)$$

What is the value of $\|30v_1\|$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

30

Question Number : 20 Question Id : 640653351233 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

Let $\beta = \{v_1, v_2\}$ be the orthonormal basis of the row space obtained by using the GramSchmidt process (with respect to usual inner product) applied on the ordered basis of the row space given by the first row and the second row of the matrix A. If

$$v_2 = \frac{1}{\sqrt{195}}(b, c, d)$$

What is the value of b?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11

Question Number : 21 Question Id : 640653351234 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

Let $\beta = \{v_1, v_2\}$ be the orthonormal basis of the row space obtained by using the GramSchmidt process (with respect to usual inner product) applied on the ordered basis of the row space given by the first row and the second row of the matrix A. If

$$v_2 = \frac{1}{\sqrt{195}}(b, c, d)$$

What is the value of c?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

7

Question Number : 22 Question Id : 640653351235 Question Type : SA Calculator : None

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

Correct Marks : 1

Question Label : Short Answer Question

Let $\beta = \{v_1, v_2\}$ be the orthonormal basis of the row space obtained by using the GramSchmidt process (with respect to usual inner product) applied on the ordered basis of the row space given by the first row and the second row of the matrix A. If

$$v_2 = \frac{1}{\sqrt{195}}(b, c, d)$$

What is the value of d?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-5

Statistics 2

Section Id :	64065322132
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	12
Number of Questions to be attempted :	12
Section Marks :	40
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 :	64065350362
Question Shuffling Allowed :	No

Question Number : 23 Question Id : 640653351236 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