Exam : Quiz 2
Subject : Maths2
Total Marks : 25.00
QP : 2022 July: IIT M FOUNDATION QUIZ2 EXAM

Exam Mode | Learning Mode

QUESTION MENU

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
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TIMER

00:16

CONTROLS

SUBMIT EXAM

Your Score
0.00 / 25.00
(0%)

Question 1 : 640653351054

Total Mark : 0.00 | Type : MCQ

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL: SEMESTER 2: 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 :

◯ Yes

◯ No

Your score : 0

Discussions (0)

Question 2 : 640653351055

View Solutions (0) Total Mark : 2.00 | Type : MSQ

Choose the correct options.

OPTIONS :

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

☐ 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 $A^TA = I$, where I is the identity matrix of order n.

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

☐ 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.

Your score : 0

Discussions (0)

Question 3 : 640653351064

View Solutions (0) Total Mark : 2.00 | Type : MSQ

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:

$$\langle \cdot, \cdot \rangle : V \times V \to \mathbb{R}$$
$$\langle (x_1, x_2), (y_1, y_2) \rangle = x_1y_1 - x_1y_2 - x_2y_1 + x_2y_2.$$

Which of the following are satisfied by the above function?

OPTIONS :

- [ ] Condition 1 is satisfied.
- [ ] Condition 2 is satisfied.
- [ ] Condition 3 is satisfied.
- [ ] Condition 4 is satisfied.

Your score : 0

Discussions (0)

Question 4 : 640653351066

View Solutions (0) Total Mark : 2.00 | Type : MSQ

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 :

- [ ] $\{(x, y, z) \mid x + 2y + z = 2, x, y, z \in \mathbb{R}\}$
- [ ] $\{(x, y, z) \mid x + 2y + z = 1, x, y, z \in \mathbb{R}\}$
- [ ] $\{(x, y, z) \mid x - 2y - z = 0, x, y, z \in \mathbb{R}\}$
- [ ] $\{(x, y, z) \mid x - 2y - z = 1, x, y, z \in \mathbb{R}\}$

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

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

Your score : 0

Discussions (0)

Question 5 : 640653351063

View Solutions (0) Total Mark : 2.00 | Type : MCQ

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 :

◯ Only the matrices in Pair I are similar matrices.

◯ All the pairs consist of similar matrices.

◯ Only the matrices in Pair III are similar matrices.

◯ None of these pairs consist of similar matrices.

Your score : 0

Discussions (0)

Question 6 : 640653351065

View Solutions (0) Total Mark : 1.00 | Type : MSQ

A norm on a vector space V is a function

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

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

satisfying the following conditions:

Condition 1: $\|x+y\| \leq \|x\| + \|y\|$ 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: $\|x\| \geq 0$ 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 :

- [ ] Condition 1 is satisfied.
- [ ] Condition 2 is satisfied.
- [ ] Condition 3 is satisfied.
- [ ] None of these conditions are satisfied.

Your score : 0

Discussions (0)

Question 7 : 640653351056

Total Mark : 0.00 | Type : 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.

Your score : 0

Question 8 :
640653351057

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the value of d – a ?

Answer (Numeric):

Answer

Accepted Answer : 0

Your score : 0

Discussions (0)

Question 9 :
640653351058

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the value of e – b?

Answer (Numeric):

Answer

Accepted Answer : -4

Your score : 0

Discussions (0)

Question 10 :
640653351059

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the value of f – c?

Answer (Numeric):

Answer

Accepted Answer : -2

Your score : 0

Discussions (0)

Question 11 :
640653351060

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the value of m?

Answer (Numeric):

Answer

Accepted Answer : 2

Your score : 0

Discussions (0)

Question 12 :
640653351061

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the value of n?

Answer (Numeric):

Answer

Accepted Answer : -1

Your score : 0

Discussions (0)

Question 13 : 640653351062

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

Find out the nullity of T.

Answer (Numeric):

Answer

Accepted Answer : 1

Your score : 0

Discussions (0)

Question 14 : 640653351067

Total Mark : 0.00 | Type : 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.

Your score : 0

Question 15 :
640653351068

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : MCQ

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 :

- $\begin{bmatrix} 1 & 3 \\ 2 & 3 \\ 5 & 3 \end{bmatrix}$
- $\begin{bmatrix} 1 & 2 & 5 \\ 3 & 3 & 3 \end{bmatrix}$
- $\begin{bmatrix} 1 & 3 & 5 \\ 2 & 3 & 3 \end{bmatrix}$
- $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

Your score : 0

Discussions (0)

Question 16 :
640653351069

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

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 ?

Answer (Numeric):

Answer

Accepted Answer : 1

Your score : 0

Discussions (0)

Question 17 :
640653351070

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

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 ?

Answer (Numeric):

Answer

Accepted Answer : 0

Your score : 0

Discussions (0)

Question 18 :
640653351071

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

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 ?

Answer (Numeric):

Answer

Accepted Answer : -3

Your score : 0

Discussions (0)

Question 19 :
640653351072

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

If {(l, m, n)} is a basis of ker(T), then Find the value of l if n is 1.

Answer (Numeric):

Answer

Accepted Answer : 3

Your score : 0

Discussions (0)

Question 20 :
640653351073

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

If {(l, m, n)} is a basis of ker(T), then Find the value of m if n is 1.

Answer (Numeric):

Answer

Accepted Answer : -4

Your score : 0

Discussions (0)

Question 21 :
640653351074

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

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 $\|30v_1\|$?

Answer (Numeric):

Answer

Accepted Answer : 30

Your score : 0

Discussions (0)

Question 22 :
640653351075

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

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?

Answer (Numeric):

Answer

Accepted Answer : 11

Your score : 0

Discussions (0)

Question 23 :
640653351076

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

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?

Answer (Numeric):

Answer

Accepted Answer : 7

Your score : 0

Discussions (0)

Question 24 :
640653351077

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

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?

Answer (Numeric):

Answer

Accepted Answer : -5

Your score : 0

Discussions (0)

SUBMIT EXAM