Exam : Quiz 2
Subject : Maths2
Total Marks : 25.00
QP : 2023 Aug: IIT M FOUNDATION AN4 EXAM 20

Exam Mode | Learning Mode

QUESTION MENU

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

TIMER

00:22

CONTROLS

SUBMIT EXAM

Your Score
0.00 / 25.00
(0%)

Question 1 : 640653586722 Total Mark : 0.00 | Type : MCQ

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER II: MATHEMATICS FOR DATA SCIENCE II (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 :

◯ YES

◯ NO

Your score : 0

Discussions (0)

Question 2 : 640653586723

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

If A is a 2×3 matrix of rank 1, then what is the nullity of AA^T?

Answer (Numeric):

Answer

Accepted Answer : 1

Your score : 0

Discussions (0)

Question 3 : 640653586724

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

Which of the following options is/are true?

OPTIONS :

☐ There exists an onto linear transformation $T : \mathbb{R}^3 \to \mathbb{R}^2$.

☐ There does not exist a one-one linear transformation $T : \mathbb{R}^3 \to \mathbb{R}$.

☐ There exists a linear transformation $T : \mathbb{R}^3 \to \mathbb{R}^2$ such that $rank(T) = nullity(T)$.

☐ There does not exist a linear transformation $T : \mathbb{R}^2 \to \mathbb{R}^3$ such that $rank(T) = nullity(T)$.

Your score : 0

Discussions (0)

Question 4 : 640653586738

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

Consider the vector space $V = \left\{ \begin{pmatrix} a & b \\ c & a \end{pmatrix} \mid c = a+b, a, b, c \in \mathbb{R} \right\}$ and $T : V \to \mathbb{R}^4$ defined by $T(A) = (a, b, c, a+b-c)$.

Choose the correct option(s).

OPTIONS :

- [ ] T is onto but not one-one
- [ ] T is one-one but not onto.
- [ ] Nullspace of T is a 2 dimensional subspace of V.
- [ ] Range of T is a 2 dimensional subspace of $\mathbb{R}^4$.

Your score : 0

Discussions (0)

Question 5 : 640653586739

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

Let A be a 3×3 rotation matrix. Choose the correct option(s).

OPTIONS :

- [ ] The rows of A are orthogonal.
- [ ] A is an orthogonal matrix.
- [ ] The columns of A are not orthonormal.

☐ $\det(A) = 0.$

Your score : 0

Discussions (0)

Question 6 : 640653586734

View Solutions (0) Total Mark : 3.00 | 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: $\langle v_1 + v_2, v_3 \rangle = \langle v_1, v_3 \rangle + \langle v_2, v_3 \rangle$, $\forall v_1, v_2, v_3 \in V$.
Condition 3: $\langle v_1, v_2 \rangle = \langle v_2, v_1 \rangle$, $\forall v_1, v_2 \in V$.
Condition 4: $\langle cv_1, v_2 \rangle = c\langle v_1, v_2 \rangle$, $\forall v_1, v_2 \in V$.

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

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

Which of the following is/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 7 : 640653586725

Total Mark : 0.00 | Type : COMPREHENSION

Let V_1 denote the vector space of solutions of $AX = 0$, where $A = \begin{pmatrix} 2 & 1 & 4 \\ -1 & 1 & 0 \\ 1 & 2 & 4 \end{pmatrix}$ and $X = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$. Let V_2 denote the vector space of solutions of the system $BY = 0$, where $B = \begin{pmatrix} 1 & 1 & 1 \\ -1 & 0 & 1 \\ 1 & 2 & 3 \end{pmatrix}$ and $Y = \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix}$. Answer the given subquestions.

Your score : 0

Question 8 :
640653586726

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the nullity of A?

Answer (Numeric):

Answer

Accepted Answer : 1

Your score : 0

Discussions (0)

Question 9 :
640653586727

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the rank of B?

Answer (Numeric):

Answer

Accepted Answer : 2

Your score : 0

Discussions (0)

Question 10 :
640653586728

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : MSQ

Which of the following forms a basis β for V1?

OPTIONS :

- ☐ $\{(1,5,2)\}$
- ☐ $\{(-\frac{4}{3},-\frac{4}{3},1)\}$
- ☐ $\{(\frac{1}{5},1,\frac{2}{5})\}$
- ☐ $\{(-4,-4,3)\}$

Your score : 0

Discussions (0)

Question 11 :
640653586729

View Parent QN | View Solutions (0)

Total Mark : 2.00 | Type : SA

Define a linear transformation
$T : V_2 \to \mathbb{R}^2$ by $T(x,y,z) = (x, x+y+z)$.
What is the rank of T?

Answer (Numeric):

Answer

Accepted Answer : 1

Your score : 0

Discussions (0)

Question 12 : 640653586730

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

Let $S : V_1 \to V_2$ be a linear transformation. If $m \times n$ is the order of the matrix D of the linear transformation S with respect to some ordered basis α_1 for V_1 and an ordered basis α_2 for V_2, what is $2m - 3n$?

Answer (Numeric):

Answer

Accepted Answer : -1

Your score : 0

Discussions (0)

Question 13 : 640653586731

Total Mark : 0.00 | Type : COMPREHENSION

Based on the above data, answer the given subquestions.

Let $T : \mathbb{R}^3 \to \mathbb{R}^3$ be the linear transformation defined by $T(x, y, z) = (x + y + z, x - y - z, x)$.

Your score : 0

Question 14 : 640653586732

View Parent QN | View Solutions (0)

Total Mark : 2.00 | Type : SA

If $A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$ denotes the matrix of T with respect to $\{(1,1,1),(1,1,0),(1,0,0)\}$ for domain and co-domain, then what is $2b + 2e + 2h$?

Answer (Numeric):

Answer

Accepted Answer : 4

Your score : 0

Discussions (0)

Question 15 :
640653586733

View Parent QN | View Solutions (0)

Total Mark : 2.00 | Type : MSQ

Let B denote the matrix of T with respect to the standard ordered basis for both domain and co-domain. Choose the correct option(s).

OPTIONS :

- ☐ A is similar to B.
- ☐ A is not similar to B.
- ☐ $\det(A) = \det(B) = 0$.
- ☐ $\det(A) = \det(B) = 2$.

Your score : 0

Discussions (0)

Question 16 : 640653586735

Total Mark : 0.00 | Type : COMPREHENSION

Based on the above data, answer the given subquestions.

Let W be the subspace of $\mathbb{R}^4$ with the standard inner product, spanned by the ordered set $\beta = \{(1,-1,0,0),(0,1,1,0)\}$. Let $\{v_1, v_2\}$ denote the orthonormal basis of W obtained by applying the Gram-Schmidt process on β.

Your score : 0

Question 17 : 640653586736

View Parent QN | View Solutions (0)

Total Mark : 1.00 | Type : SA

Let $P_W : \mathbb{R}^4 \to W$ denote the projection map. What is the nullity of P_W?

Answer (Numeric):

Answer

Accepted Answer : 2

Your score : 0

Discussions (0)

Question 18 : 640653586737

View Parent QN | View Solutions (0)

Total Mark : 3.00 | Type : SA

If $P_W(0,1,0,1) = (a,b,c,d)$, what is $3(a+b+c+d)$?

Answer (Numeric):

Answer

Accepted Answer : 2

Your score : 0

Discussions (0)

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