



Exam : Quiz 2  
Subject : Maths2  
Total Marks : 25.00  
QP : 2024 Dec01: IIT M AN EXAM QDF4

Exam Mode

Learning Mode

View Question Paper Summary

QUESTION MENU

1 2 3 4 5 6 7 8 9  
10 11 12 13 14 15 16 17 18  
19 20 21 22

TIMER

00:34



CONTROLS

SUBMIT EXAM

Your Score

**0.00 / 25.00**

(0%)

Question 1 : 6406531026094

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 : 6406531026095**

Total Mark : 0.00 | Type : COMPREHENSION

Based on the above data, answer the given subquestions.

Let  $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$  be a linear transformation such that  $T(1, 1, 0) = (1, -1)$ ,   
 $T(0, 1, 1) = (1, 0)$ ,  $T(1, 0, 1) = (1, 1)$ . If  $T(3, -1, 4) = (a, b)$

**Your score : 0****Question 3 :****6406531026096** View Parent QN View Solutions (0)

Total Mark : 1.00 | Type : SA

Find a.

Answer (Numeric):

Answer

Accepted Answer : 3

**Your score : 0** Discussions (0)

**Question 4 :**  
**6406531026097**

View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : SA

Find b.

Answer (Numeric):

Answer

Accepted Answer : 5

Your score : 0

Discussions (0)



**Question 5 :**  
**6406531026098**

View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : SA

Is T injective or surjective? If T is injective, write the answer as 1 and if T is surjective, write the answer as -1.

Answer (Numeric):

Answer

Accepted Answer : -1

Your score : 0

Discussions (0)



**Question 6 : 6406531026106**

Total Mark : 0.00 | Type : COMPREHENSION

Based on the above data, answer the given subquestions.

Let  $A = \begin{bmatrix} k & -3 \\ 1 & 2-k \end{bmatrix}$ , where  $k$  is a positive real number. Let  $I_2$  denote the identity matrix of order 2.



Your score : 0

**Question 7 :****6406531026107**

View Parent QN



View Solutions (0)

Total Mark : 1.00 | Type : SA

If  $A$  is equivalent to  $I_2$ , then find the rank of  $A$ .

**Answer (Numeric):**

Answer

**Accepted Answer : 2**

Your score : 0

Discussions (0)

**Question 8 :****6406531026108**

View Parent QN



View Solutions (0)

Total Mark : 1.00 | Type : SA

Find the value of  $k$  for which  $A$  is not equivalent to  $I_2$ .

**Answer (Numeric):**

Answer

**Accepted Answer : 3**

Your score : 0

Discussions (0)



**Question 9 :**  
**6406531026109**
 View Parent QN

 View Solutions (0)

Total Mark : 1.00 | Type : SA

Find the number of values of  $k$  for  which  $A$  is similar to  $I_2$ .

Answer (Numeric):

Answer

Accepted Answer : 0

Your score : 0

 Discussions (0)

**Question 10 : 6406531026111**

Total Mark : 0.00 | Type : COMPREHENSION

Consider the following vectors in  $\mathbb{R}^3$ . 

$$u_1 = \left( \frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right), \quad u_2 = \left( \frac{1}{\sqrt{2}}, 0, -\frac{1}{\sqrt{2}} \right), \quad u_3 = \left( \frac{1}{\sqrt{6}}, \frac{2k}{\sqrt{6}}, \frac{k}{\sqrt{6}} \right),$$

where  $k \in \mathbb{R}$ . Answer the given subquestions using the standard inner product on  $\mathbb{R}^3$ .

Your score : 0


**Question 11 :**  
**6406531026112**
 View Parent QN

 View Solutions (0)

Total Mark : 1.00 | Type : SA

Find the number of values of  $k$  for  which the vector  $u_3$  is a unit vector.

Answer (Numeric):

Answer

Accepted Answer : 2

Your score : 0

Discussions (0)



**Question 12 :**

**6406531026113**

View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : SA

Find the value of  $k$  for which  
 $\{u_1, u_2, u_3\}$  is an orthonormal basis  
of  $\mathbb{R}^3$ .



Answer (Numeric):

Answer

Accepted Answer : 1

Your score : 0

Discussions (0)



**Question 13 :**

**6406531026114**

View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : SA

For  $k = 0$ , find the angle (in degrees)   
between  $u_2$  and  $u_3$ .

Answer (Numeric):

Answer

Accepted Answer : 45

Your score : 0

[Discussions \(0\)](#)**Question 14 : 6406531026099**[View Solutions \(0\)](#)

Total Mark : 3.00 | Type : MCQ



Let  $T: \mathbb{R}^n \rightarrow \mathbb{R}^m$  be a linear transformation. Choose the correct option that guarantees that  $T$  is bijective:

OPTIONS :

- $m = n.$
- $T$  maps a basis of  $\mathbb{R}^n$  to a basis of  $\mathbb{R}^m.$
- The matrix representation of  $T$  with respect to any ordered basis is square and invertible.
- $\text{rank}(T) = m.$

Your score : 0

[Discussions \(0\)](#)**Question 15 : 6406531026100**

Total Mark : 0.00 | Type : COMPREHENSION

Based on the above data, answer the given subquestions.

Let  $T: \mathbb{R}^2 \rightarrow \mathbb{R}^3$  be a linear transformation given by  $T(x, y) = (2x - 3y, -x + 5y, x + y).$

Your score : 0



**Question 16 :**  
**6406531026101**

View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : SA

Let  $S$  be any straight line in  $\mathbb{R}^2$  passing through the origin. If  $T(S)$  represents the image of  $S$  under  $T$  in  $\mathbb{R}^3$ , what is the dimension of the subspace  $T(S)$ ?

Answer (Numeric):

Answer

Accepted Answer : 1

Your score : 0

Discussions (0)



**Question 17 :**  
**6406531026102**

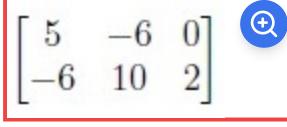
View Parent QN

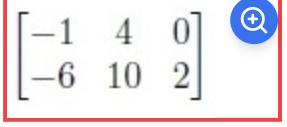
View Solutions (0)

Total Mark : 1.00 | Type : MCQ

Let  $\mathcal{B}_1 = \{(1, -1), (0, 2)\}$  and   
 $\mathcal{B}_2 = \{(1, 0, 0), (0, 1, 0), (0, 0, 1)\}$ .  
 Which of the following matrices is the matrix representation of  $T$  with respect to the basis  $\mathcal{B}_1$  for domain and  $\mathcal{B}_2$  for co-domain.

OPTIONS :

- 

$$\begin{bmatrix} 5 & -6 & 0 \\ -6 & 10 & 2 \end{bmatrix}$$
- 

$$\begin{bmatrix} -1 & 4 & 0 \\ -6 & 10 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 5 & -6 \\ -6 & 10 \\ 0 & 2 \end{bmatrix}$$
 
$$\begin{bmatrix} -1 & -6 \\ 4 & 10 \\ 0 & 2 \end{bmatrix}$$

Your score : 0

 Discussions (0)

**Question 18 :****6406531026103** View Parent QN View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the rank of T ?

Answer (Numeric):

Answer

Accepted Answer : 2

Your score : 0

 Discussions (0)

**Question 19 :****6406531026104** View Parent QN View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the nullity of T ?

Answer (Numeric):

Answer

Accepted Answer : 0

Your score : 0

Discussions (0)

**Question 20 : 6406531026105**

View Solutions (0)

Total Mark : 3.00 | Type : MSQ



Let  $V = \text{span}\{(3, 0, 0), (0, -2, 2), (-1, 1, -1)\}$ . Let  $T: V \rightarrow \mathbb{R}^2$  be a linear transformation defined by  $T(x, y, z) = (x - cy, y + z)$ . Choose all the correct options from the following:

OPTIONS :

- $T$  is not one-one for any value of  $c$ .
- $T$  is one-one when  $c = 0$ .
- $\text{rank}(T) = 1$  for all values of  $c$ .
- $\text{nullity}(T) = 2$  for some  $c$ .
- There exist non-zero real numbers  $\alpha$  and  $\beta$  such that  $\alpha(3, 0, 0) + \beta(0, -2, 2)$  is in  $\text{ker}(T)$ .

Your score : 0

Discussions (0)

**Question 21 : 6406531026110**

View Solutions (0)

Total Mark : 3.00 | Type : MSQ



Consider the system of equations given by  $Ax = b$ , where  $A$  is an  $m \times n$  matrix and  $b$  is a vector in  $\mathbb{R}^m$ . Choose all the correct options that guarantee that the set of solutions to the given system of equations is an affine subspace of  $\mathbb{R}^n$ .

OPTIONS :

- $b = 0$ .
- $b$  is in the column space of  $A$ .

$\text{rank}(A) = n.$  

$m = n$  and  $A$  is an invertible matrix. 

Your score : 0

 Discussions (0)



### Question 22 : 6406531026115

 View Solutions (0)

Total Mark : 3.00 | Type : MSQ 

Let  $W$  denote the subspace of  $\mathbb{R}^3$  spanned by the vectors  $u_1 = (1, 1, 0)$  and  $u_2 = (0, 0, 1)$ . Let  $P_W : \mathbb{R}^3 \rightarrow \mathbb{R}^3$  denote the linear transformation which maps every vector to its projection (with respect to the standard inner product on  $\mathbb{R}^3$ ) on to the subspace  $W$ . Choose all the correct statements from the following.

OPTIONS :

The Gram-Schmidt process starting with the set  $\{u_1, u_2\}$  yields the orthonormal basis  $\left\{ \frac{1}{\sqrt{2}}(1, 1, 0), \frac{1}{\sqrt{2}}(0, 0, 1) \right\}$  of  $W$ . 

$P_W(0, 1, 1) = \left(\frac{1}{2}, \frac{1}{2}, 1\right)$  

The nullity of  $P_W$  is 1. 

$P_W$  is an orthogonal transformation. 

Your score : 0

 Discussions (0)



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