Sem2 Maths2

Section Id :	64065339667
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	9
Number of Questions to be attempted :	9
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 :	64065383999
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 116 Question Id : 640653586120 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 "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 :

6406531956126. ✔ YES

6406531956127. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	64065384000
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 117 Question Id : 640653586121 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

If A is a 2×3 matrix of rank 1, then what is the nullity of AA^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 :	3
Sub-Section Id :	64065384001
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 118 Question Id : 640653586122 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options is/are true?

Options :

6406531956129. ✔ There exists an onto linear transformation $T : \mathbb{R}^3 \to \mathbb{R}^2$.

6406531956130. ✔ There does not exist a one-one linear transformation $T : \mathbb{R}^3 \to \mathbb{R}$.

6406531956131. ✖ There exists a linear transformation $T : \mathbb{R}^3 \to \mathbb{R}^2$ such that $rank(T) = nullity(T)$.

6406531956132. ✖ There does not exist a linear transformation $T : \mathbb{R}^2 \to \mathbb{R}^3$ such that $rank(T) = nullity(T)$.

Question Number : 119 Question Id : 640653586136 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

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 :

6406531956152. ✖ T is onto but not one-one

6406531956153. ✔ T is one-one but not onto.

6406531956154. ✖ Nullspace of T is a 2 dimensional subspace of V.

6406531956155. ✔ Range of T is a 2 dimensional subspace of $\mathbb{R}^4$.

Question Number : 120 Question Id : 640653586137 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

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

Options :

6406531956156. ✔ The rows of A are orthogonal.

6406531956157. ✔ A is an orthogonal matrix.

6406531956158. ✖ The columns of A are not orthonormal.

6406531956159. ✖ $\det(A) = 0$.

Sub-Section Number :	4
Sub-Section Id :	64065384002
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 121 Question Id : 640653586132 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

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: $\langle v_1 + v_2, v_3 \rangle = \langle v_1, v_3 \rangle + \langle v_2, v_3 \rangle$, $\forall v_1, v_2, v_3 \in V$.

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 :

6406531956146. ✖ Condition 1 is satisfied.

6406531956147. ✔ Condition 2 is satisfied.

6406531956148. ✖ Condition 3 is satisfied.

6406531956149. ✔ Condition 4 is satisfied.

Sub-Section Number :	5
Sub-Section Id :	64065384003
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653586123 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 : (122 to 126)

Question Label : 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.

Sub questions

Question Number : 122 Question Id : 640653586124 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 nullity 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 : 123 Question Id : 640653586125 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 rank of *B*?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 124 Question Id : 640653586126 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following forms a basis β for V_1?

Options :

6406531956135. ✖ $\{(1,5,2)\}$

6406531956136. ✔ $\{(-\frac{4}{3},-\frac{4}{3},1)\}$

6406531956137. ✖ $\{(\frac{1}{5},1,\frac{2}{5})\}$

6406531956138. ✔ $\{(-4,-4,3)\}$

Question Number : 125 Question Id : 640653586127 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

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?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 126 Question Id : 640653586128 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 $S : V_1 \to V_2$ 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 $2m - 3n$?

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 :	64065384004
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653586129 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 : (127 to 128)

Question Label : Comprehension

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

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 127 Question Id : 640653586130 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

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
$2b + 2e + 2h$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 128 Question Id : 640653586131 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

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 :

6406531956142. ✔ A is similar to B.

6406531956143. ✖ A is not similar to B.

6406531956144. ✔ $\det(A) = \det(B) = 0$.

6406531956145. ✖ $\det(A) = \det(B) = 2$.

Question Id : 640653586133 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 : (129 to 130)

Question Label : Comprehension

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.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 129 Question Id : 640653586134 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 $P_W : \mathbb{R}^4 \to W$ denote the projection map. What is the nullity of P_W?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 130 Question Id : 640653586135 Question Type : SA Calculator : None

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

Correct Marks : 3

Question Label : Short Answer Question

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

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Sem2 Statistics2

Section Id :	64065339668
Section Number :	7
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	12
Number of Questions to be attempted :	12
Section Marks :	40