Question 1

If $D_1 = \{(1, 1, 0, 0), (0, 1, 1, 0), (1, 2, 1, 0)\}$,
$D_2 = \{(1, 0, 1, 0), (-1, 1, 0, 0), (0, 0, 1, 1)\}$ and
$D_3 = \{(0, 1, 0, 1), (-1, 1, 1, 1), (-1, 2, 1, 2)\}$ are

susets of $\mathbb{R}^4$, then :

- ○ D_1 is Linearly Independent .
- ○ D_2 is Linearly Independent .
- ○ D_3 is Linearly Independent.
- ○ Each of the sets D_1 and D_3 is Linearly Independent .

If $C_1 = \{(1, 1, 3), (-2, 1, 1), (-1, 2, 4)\}$,
$C_2 = \{(-3, 1, 1), (1, -1, 0), (-2, 0, 1)\}$ and
$C_3 = \{(1, 2, 2), (-1, 1, 1), (1, 3, 0)\}$ are
sets of vectors, then:

- C_3 is a basis for $\mathbb{R}^3$.
- C_1 is the only basis for $\mathbb{R}^3$.
- C_2 is the only basis for $\mathbb{R}^3$.
- Each of the sets C_1 and C_2 is a basis of $\mathbb{R}^3$.

Question 8

Let $B = \{v_1, v_2, v_3\}$ be an orthogonal set of non-zero vectors in the Euclidean inner product space $\mathbb{R}^3$.
Which of the following statements is correct?

- a. B is an orthonormal basis for $\mathbb{R}^3$.
- b. $span(B)$ is a proper subspace of $\mathbb{R}^3$.
- c. B is an orthonormal basis for $span(B)$.
- d. $dim(span(B)) = 3$.

Moving to the next question prevents changes to this answer.

Question 7

Let $T: \mathbb{R}^3 \to \mathbb{R}^2$; $T(x,y,z) = (x+y, y-z)$ be a linear transformation. Then the standard matrix of T with respect to the natural bases is:

a. $\begin{bmatrix} -1 & -1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$

c. $\begin{bmatrix} 1 & -1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$

d. $\begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & -1 \end{bmatrix}$

QUESTION 4

If u and v are vectors in $\mathbb{R}^n$, such that $\|u\| = 3$, $\|u+v\| = 5$ and u and v are orthogonal, then $\|v\|$ is

- 4
- $\sqrt{5}$
- 0
- 2

QUESTION 3

The vectors $u = (1, 0, 1)$ and $v = (2, 1, 2)$ span $\mathbb{R}^3$.

- True
- False

QUESTION 7

If $w_1 = (5,\ 7)$ and $w_2 = (3,\ 4)$, then the distance $d(w_1,\ w_2)$ equals

- $\sqrt{13}$
- 13
- (2,3)
- 5

QUESTION 8

If $u = (1, -2, 1)$ and $v = (2, 1, 1)$, then the values of a and b such that $au + bv = (-6, -8, -2)$ are

- $a = 2, b = -4$
- $a = -4, b = 2$
- $a = b = 2$
- $a = b = 4$

QUESTION 9

There exist vectors $u, v \in \mathbb{R}^n$, such that $||u+v|| = ||u|| + ||v||$.

- True
- False

QUESTION 10

If $u = (1, 2, 1)$, then the values of the number k, such that $\|ku\| = \sqrt{24}$ are

- $k = \pm\sqrt{6}$
- $k = \pm 6$
- $k = \pm 2$
- $k = \pm\sqrt{2}$

QUESTION 11

If $u = (-3, 4, x)$ has norm $||u|| = 6$, then x equals

- $\pm\sqrt{2}$
- 1
- $\pm\sqrt{11}$
- 6

QUESTION 12

The set of all 2×2 matrices A, such that $\det(A) = 1$ is a subspace of M_{22}.

- True
- False

QUESTION 13

The unit vector that has the same direction as $v = (3, 4, 12)$ is

- $u = (\frac{1}{3}, \frac{1}{4}, \frac{1}{12})$
- $u = (-3, -4, -12)$
- $u = (\frac{3}{12}, \frac{4}{12}, 1)$
- $u = (\frac{3}{13}, \frac{4}{13}, \frac{12}{13})$

QUESTION 14

Let $V = \mathbb{R}^2$ be the vector space on which addition is defined by $u + v = (u_1 + v_1 + 1, u_2 + v_2 - 1)$, for all $u = (u_1, u_2)$, $v = (v_1, v_2) \in \mathbb{R}^2$. The **zero vector** $\mathbf{0_V}$ is

- $(0,0)$
- $(1,-1)$
- $(-1,1)$
- $(-1,-1)$

Question 16

1 points Save Answ

Let V be a vector space of dimension 7 and S a basis for V. If $G=\{v_1, v_2, v_3, v_4, v_5\}$ is linearly independent subset of V, where $v_4 \notin S$, then:

- a. *Any nonempty subset of S is linearly independent.*
- b. *The set $S \cup G$ is linearly independent.*
- c. *The set $S \cap G$ generates V.*
- d. *the set G is a basis for V.*

Question 10

Let $\alpha \in R$ and $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$; $T(x,y,z) = (x+y-3z\ ,z+y+\propto^2-1)$ be a function. Then the value (s) of $\propto$ such that T is not a linear transformation is (are):

- a. $\propto = -1$
- b. $\propto = 1$
- c. $\propto \in \{-1,1\}$
- d. $\propto \in \mathbb{R}-\{-1,+1\}$

Question 20

If u and v are vectors in a real inner product space $(V, <\ ,\ >)$ *with* $\|u\|=1$ *and* $\|v\|=2$*, which of the following statements is correct?*

- a. The number $<u, v>$ lies between 1 and 2
- b. The number $|<u, v>|$ is less than or equal to 2.
- c. The number $<u, v>$ is less than 1.
- d. The number $|<u, v>|$ is greater than or equal to $\frac{1}{2}$.

Question 7

Let $\alpha \in R$ and $T: \mathbb{R}^3 \to \mathbb{R}^2$; $T(x,y,z) = (x+y-3z, z+y+\alpha^2+5\alpha+4)$ be a function. Then the value (s) of α such that T is not a linear transformation is (are)

a. $\alpha = -1$

b. $\alpha = -4$

c. $\alpha \in \{-1, -4\}$

d. $\alpha \in \mathbb{R} - \{-1, -4\}$

Let $\alpha \in R$ *and* $T: \mathbb{R}^3 \to \mathbb{R}^2$; $T(x,y,z) = (x + y - 3z\ , z + y + \propto^2 + 5\propto + 4)$ *be a function.*
Then the value (s) of $\propto$ *such that* T *is not a linear transformation is (are):*

a. $\propto\ = -1$

b. $\propto\ = -4$

c. $\propto\ \in \{-1, -4\}$

d. $\propto\ \in \mathbb{R} - \{-1, -4\}$

QUESTION 2

For $u, v \in \mathbb{R}^n$, with $||u||^2 = 5, ||v||^2 = 1$ and $u \cdot v = -2$, the expression $(u+2v)\cdot(4u-v)$ equals

- $\sqrt{5}$
- 20
- 18
- 4

QUESTION 6

The Vectors $(2, 1, 2)$ and $(-1, 0, u)$ are orthogonal if

- $u = 2$
- $u = 1$
- $u = 0$
- $u = -1$

Question 6

If the Gram – Schmidt orthogonalization algorithm is applied on the set $\{v_1 = (1,1,1,0), v_2 = (0,1,0,1)\}$ *of vectors in the Euclidean inner product space* $\mathbb{R}^4$, *which of the following sets is obtained?*

- a. $\{(-1,1,1,0), (\frac{1}{3}, 0, \frac{1}{3}, 1)\}$
- b. $\{(1,1,1,0), (-\frac{1}{3}, \frac{2}{3}, -\frac{1}{3}, 1)\}$
- c. $\{(0,1,1,0), (-1,0,0,1)\}$
- d. $\{(0,1,0,1), (-1,1,-1,0)\}$.

Question 4

If u and v are linearly independent vectors in a real inner product space (V , < , >) with $\|u\| = 3$ *and* $\|v\| = \frac{1}{3}$*, which of the following statements is correct?*

- a. *The number* $|\langle u, v\rangle|$ *is strictly less than 1.*
- b. *The number* $|\langle u, v\rangle|$ *is equal to* $\frac{1}{3}$
- c. *The number* $\langle u, v\rangle$ *is greater than or equal to* $\frac{1}{3}$.
- d. *The number* $\langle u, v\rangle$ *is equal to 1.*

Question 6

Let $B=\{v_1,v_2,v_3\}$ be an orthogonal set of non-zero vectors in the Euclidean inner product space $\mathbb{R}^3$. Which of the following statements is correct?

- a. B is not an orthonormal basis for $\mathbb{R}^3$.
- b. span(B) is a proper subspace of $\mathbb{R}^3$.
- c. $\dim(\text{span}(B)) \geq 3$.
- d. $\dim(\text{span}(B)) \neq 3$

Question 7

Let $B = \{v_1, v_2, v_3\}$ be an orthogonal set of non-zero vectors in the Euclidean inner product space R^3. Which of the following statements is correct?

- a. B is linearly dependent.
- b. $\text{span}(B) = \mathbb{R}^3$.
- c. B is orthonormal.
- d. B is not a basis for $\mathbb{R}^3$.

Question 7

If the Gram – Schmidt orthogonalization algorithm is applied on the set $\{v_1 := (0,1,0,1), v_2 := (1,1,1,0)\}$ *of vectors in the Euclidean inner product space* $\mathbb{R}^4$*, which of the following sets is obtained?*

- a. $\{(1,\frac{1}{2},1,-\frac{1}{2}),(0,1,0,1)\}.$
- b. $\{(1,1,1,0),(1,\frac{1}{2},1,-\frac{1}{2})\}.$
- c. $\{(1,1,1,0),(1,\frac{1}{2},-\frac{1}{2},1)\}.$
- d. $\{(-\frac{1}{3},\frac{2}{3},-\frac{1}{3},1),(1,\frac{1}{2},1,-\frac{1}{2})\}$

Question 1

Let K be a subspace of M_{22} generated by the set

$$D=\left\{\begin{bmatrix}1&0\\1&0\end{bmatrix},\begin{bmatrix}1&0\\0&1\end{bmatrix},\begin{bmatrix}0&0\\0&1\end{bmatrix}\right\}$$

If $v=\begin{bmatrix}2&0\\1&5\end{bmatrix}$, then :

- ○ K is not linearly independent .
- ○ v is not an element of K .
- ◉ $[v]_D = (1, 1, 4)$
- ○ $[v]_D = (2, 1, 5)$

Question 2

If $S_1 = \{(1, 1, 1), (0, 1, 1), (1, 0, 0)\}$,
$S_2 = \{(-1, 1, 1), (1, 1, 0), (0, 1, 1)\}$ and
$S_3 = \{(1, 0, 0), (0, 1, 0), (2, 3, 0)\}$ are
subsets of $\mathbb{R}^3$, then:

- ○ S_3 is the only basis for $\mathbb{R}^3$.
- ○ Each of the sets S_1 and S_3 is a basis of $\mathbb{R}^3$.
- ○ S_1 is the only basis for $\mathbb{R}^3$.
- ◉ S_2 is a basis for $\mathbb{R}^3$.

Question 3

If $\mathbf{T}: \mathbb{R}^2 \to \mathbb{R}^2$ is the unique linear transformation determined by $\mathbf{T}(1,0) = (0,1)$ and $T(0,1) = (1,0)$, then:

- (selected) $\mathbf{T}(x,y) = (y,x)$, for all $(x,y) \in \mathbb{R}^2$
- $\mathbf{T}(x,y) = (x,x)$, for all $(x,y) \in \mathbb{R}^2$
- $\mathbf{T}(x,y) = (y,y)$, for all $(x,y) \in \mathbb{R}^2$
- $\mathbf{T}(x,y) = (x,y)$, for all $(x,y) \in \mathbb{R}^2$

Question 4

Let $\mathbf{T}: \mathbb{R}^3 \to \mathbb{R}^3$ be the linear transformation given by $\mathbf{T}(x,y,z) = (x-2y+z,\ x+y-2z,\ 2x-y-z)$.
Then a basis of ***Ker***(**T**) is:

- [x] $\{(1,1,1)\}$
- [ ] $\{(1,-1,1)\}$
- [ ] $\{(-1,-1,1)\}$
- [ ] $\{(1,1,0)\}$

Question 5

If $H = \{ (x, y, z) : x + 2y + 2z = 0 \quad \text{and} \quad x + 4z = 0 \}$, then :

- (0, 2, 1) is an element in H .
- Dim (H) = 2
- (-4, 1, 1) is an element in H .
- (1, 1, 0) is an element in H .

Question 6

Let $\mathbb{R}^3$ be the Euclidean space with the standard inner product $<(a,b,c),(a',b',c')> = aa' + bb' + cc'$.
Then the values of $\boldsymbol{x}$ and $\boldsymbol{y}$, for which the set $\{(x-y, y, 1), (2,1,-1), (1,-1,1)\}$ is orthogonal, are:

- (selected) $x = 1, y = 1$
- $x = -1, y = -1$
- $x = -1, y = 1$
- $x = 1, y = -1$

Question 7

Let $<(a,b),(c,d)> = ac + 2bd$ be an inner product in $\mathbb{R}^2$.

Then **cosine of the angle** between $(1,1)$ and $(1,-2)$ is equal to:

- (selected) $\frac{-1}{\sqrt{3}}$
- $\frac{-1}{10}$
- 0
- $\frac{-1}{\sqrt{10}}$

Let A be a 5×8 matrix. If $rank(A) = 3$, then:

- a. $Nullity(A^T) = 2.$
- b. $Nullity(A) = 2.$
- c. $rank(A^T) = 5.$
- d. $dim(row(A)) = 5.$

Question 8

Let $B = \{v_1, v_2, v_3\}$ be an orthogonal set of non-zero vectors in the Euclidean inner product space $\mathbb{R}^3$.
Which of the following statements is correct?

- a. B is an orthonormal basis for $\mathbb{R}^3$.
- b. $\text{span}(B)$ is a proper subspace of $\mathbb{R}^3$.
- c. B is an orthonormal basis for $\text{span}(B)$.
- d. $\dim(\text{span}(B)) = 3$.

⚠ Moving to the next question prevents changes to this answer.

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Timed Test	This test has a time limit of 2 hours.This test will save and submit automaticall Warnings appear when **half the time, 5 minutes, 1 minute,** and **30 seconds**
Multiple Attempts	This test allows 2 attempts. This is attempt number 2.
Force Completion	This test can be saved and resumed at any point until time has expired. The tin
	This test does not allow backtracking. Changes to the answer after submission

Remaining Time: 58 minutes, 25 seconds.

Question Completion Status:

⚠ Moving to the next question prevents changes to this answer.

Question 7

Let $T: \mathbb{R}^3 \to \mathbb{R}^2$; $T(x,y,z) = (x+y, y-z)$ *be a linear transformation.*
Then the standard matrix of T *with respect to the natural bases is:*

a. $\begin{bmatrix} -1 & -1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$

c. $\begin{bmatrix} 1 & -1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$

d. $\begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & -1 \end{bmatrix}$

Question Completion Status:

Question 20

Let $T: \mathbf{R}^3 \rightarrow \mathbf{R}^2$; $T(x,y,z) = (x-y, y-z)$ be a linear transformation, then the standard matrix of T with respect to the natural bases is:

a. $\begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & -1 \end{bmatrix}$

b. $\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$

c. $\begin{bmatrix} 1 & -1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$

d. $\begin{bmatrix} 1 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$

Click **Submit** to complete this assessment.

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Question 16

1 points Save Answ

Let V be a vector space of dimension 7 and S a basis for V. If $G = \{v_1, v_2, v_3, v_4, v_5\}$ is linearly independent subset of V, where $v_4 \notin S$, then:

- a. *Any nonempty subset of S is linearly independent.*
- b. *The set $S \cup G$ is linearly independent.*
- c. *The set $S \cap G$ generates V.*
- d. *the set G is a basis for V.*

Moving to the next question prevents changes to this answer.

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Remaining Time: **1 hour, 42 minutes, 06 seconds.**

Question Completion Status:

Moving to the next question prevents changes to this answer.

Question 7

Question 7

1 points

Let $\alpha \in R$ and $T: \mathbb{R}^3 \to \mathbb{R}^2$; $T(x,y,z) = (x + y - 3z, z + y + \alpha^2 + 5\alpha + 4)$ be a function.
Then the value (s) of α such that T is not a linear transformation is (are)

a. $\alpha = -1$

b. $\alpha = -4$

c. $\alpha \in \{-1, -4\}$

d. $\alpha \in \mathbb{R} - \{-1, -4\}$

Moving to the next question prevents changes to this answer.

Moving to the next question prevents changes to this answer.

Question 10

Let $\alpha \in R$ and $T: \mathbb{R}^3 \to \mathbb{R}^2$; $T(x,y,z) = (x+y-3z, z+y+\alpha^2-1)$ be a function. Then the value (s) of α such that T is not a linear transformation is (are):

- a. $\alpha = -1$
- b. $\alpha = 1$
- c. $\alpha \in \{-1, 1\}$
- d. $\alpha \in \mathbb{R} - \{-1, +1\}$

Moving to the next question prevents changes to this answer.

Let $\alpha \in R$ *and* $T: \mathbb{R}^3 \to \mathbb{R}^2$; $T(x,y,z) = (x + y - 3z\ , z + y + \propto^2 + 5\propto + 4)$ *be a function.*
Then the value (s) of $\propto$ *such that* T *is not a linear transformation is (are):*

- a. $\propto\ = -1$
- b. $\propto\ = -4$
- c. $\propto\ \in \{-1, -4\}$
- d. $\propto\ \in \mathbb{R} - \{-1, -4\}$

Question 20

If u and v are vectors in a real inner product space $(V, < , >)$ *with* $\|u\| = 1$ *and* $\|v\| = 2$, *which of the following statements is correct?*

- a. *The number* $< u ,v >$ *lies between 1 and 2*
- b. *The number* $|< u ,v >|$ *is less than or equal to 2.*
- c. *The number* $< u ,v >$ *is less than 1.*
- d. *The number* $|< u ,v >|$ *is greater than or equal to* $\frac{1}{2}$.

Click **Submit** to complete this assessment.

QUESTION 2

For $u, v \in \mathbb{R}^n$, with $||u||^2 = 5$, $||v||^2 = 1$ and $u \cdot v = -2$, the expression $(u+2v)\cdot(4u-v)$ equals

- $\sqrt{5}$
- 20
- 18
- 4

QUESTION 3

4

QUESTION 3

The vectors $u = (1, 0, 1)$ and $v = (2, 1, 2)$ span $\mathbb{R}^3$.

True

False

QUESTION 4

If u and v are vectors in $\mathbb{R}^n$, such that $||u|| = 3$, $||u + v|| = 5$ and u and v are o

True

False

QUESTION 4

If u and v are vectors in $\mathbb{R}^n$, such that $||u|| = 3$, $||u+v|| = 5$ and u and v are orthogonal, then $||v||$ is

- 4
- $\sqrt{5}$
- 0
- 2

QUESTION 5

$$x+y+z=0$$

$S = span\{(1, 2, 1), (1, -2, 1)\}$

QUESTION 6

The Vectors $(2, 1, 2)$ and $(-1, 0, u)$ are orthogonal if

- $u = 2$
- $u = 1$
- $u = 0$
- $u = -1$

QUESTION 7

If $w_1 = (5, 7)$ and $w_2 = (3, 4)$, then the distance $d(w_1, w_2)$ equals

- $\sqrt{13}$
- 13
- (2,3)
- 5

QUESTION 8

- 5

QUESTION 8

If $u = (1, -2, 1)$ and $v = (2, 1, 1)$, then the values of a and b such that $au + bv = (-6, -8, -2)$ are

- $a = 2, b = -4$
- $a = -4, b = 2$
- $a = b = 2$
- $a = b = 4$

QUESTION 9

$a = b = 4$

QUESTION 9

There exist vectors $u, v \in \mathbb{R}^n$, such that $|| u + v || = || u || + || v ||$.

- True
- False

QUESTION 10

If $u = (1, 2, 1)$, then the values of the number k, such that $|| ku || = \sqrt{24}$ are

- $k = \pm\sqrt{6}$

False

QUESTION 10

If $u = (1, 2, 1)$, then the values of the number k, such that $||\, ku\,|| = \sqrt{24}$ are

- $k = \pm\sqrt{6}$
- $k = \pm 6$
- $k = \pm 2$
- $k = \pm\sqrt{2}$

QUESTION 11

If $u = (-3, 4, x)$ has norm $||u|| = 6$, then x equals

- $\pm\sqrt{2}$
- 1
- $\pm\sqrt{11}$
- 6

$\pm\sqrt{11}$

6

QUESTION 12

The set of all 2×2 matrices A, such that $\det(A) = 1$ is a subspace of M_{22}.

True

False

QUESTION 13

The unit vector that has the same direction as $\mathbf{v} = (3, 4, 12)$ is

False

QUESTION 13

The unit vector that has the same direction as $v = (3, 4, 12)$ is

- $u = (\frac{1}{3}, \frac{1}{4}, \frac{1}{12})$
- $u = (-3, -4, -12)$
- $u = (\frac{3}{12}, \frac{4}{12}, 1)$
- $u = (\frac{3}{13}, \frac{4}{13}, \frac{12}{13})$

Click Save and Submit to save and submit. Click Save All Answers to save all answers.

$u = (\frac{3}{13}, \frac{4}{13}, \frac{12}{13})$

QUESTION 14

1 poir

Let $V = \mathbb{R}^2$ be the vector space on which addition is defined by $u + v = (u_1 + v_1 + 1, u_2 + v_2 - 1)$, for all $u = (u_1, u_2)$, $v = (v_1, v_2) \in \mathbb{R}^2$. The **zero vector** $\mathbf{0_V}$ is

- (0,0)
- $(1, -1)$
- $(-1, 1)$
- $(-1, -1)$

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○ $(-1,-1)$

QUESTION 15

The set $V=\{(x,y,z,u)\in\mathbb{R}^4 : 2x-4y+z-u=1\}$ is a subspace of $\mathbb{R}^4$.

- True
- False

Click Save and Submit to save and submit. Click Save All Answers to save all answers.

6) If $v_1 = (1,1,0)$, $v_2 = (2,2,0)$, $v_3 = (1,-1,1)$, then the dimension of Span $\{v_1, v_2, v_3\}$ is

(a) 0	(b) 1	(c) 2	(d) 3

7) If $S = \{1+x, 2+x, x^2\}$ is a basis for $\mathcal{P}_2$ and the coordinate vector of $p(x) \in \mathcal{P}_2$ is $(p)_S = (1,2,3)$, then $p(x)$ is

(a) $1 + 2x + 3x^2$	(b) $3 + 2x + 3x^2$	(c) $5 + 3x + 3x^2$	(d) None of the previous

8) If B is a 5×7 matrix and null $(B) = 3$, then null (B^T) equals

(a) 2	(b) 5	(c) 3	(d) 1

9) If $v_1 = (a,1,2,6)$ and $v_2 = (2,2a,1,-1)$ are two orthogonal vectors, then

(a) $a = 1$	(b) $a = -1$	(c) $a = 0$	(d) None of the previous

10) If B is a 3×3 matrix with det $B = 2$, then

(a) nullity $(B) = 2$, rank $(B) = 1$	(b) nullity $(B) = 0$, rank $(B) = 3$	(c) nullity $(B) = 3$, rank $(B) = 3$	(d) None of the previous