

VIRTUAL UNIVERSITY OF PAKISTAN

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Best of luck!



Question No : 1 of 26

Marks: 1 (Budgeted Time 1 Min)

$7x$ is an algebraic term in which 7 is a _____ and x is a _____.

Answer (Please select your correct option)

☐ term, expression

☐ coefficient, variable

☐ variable, coefficient

☐ numerical, alphabet



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Question No : 2 of 26

Marks: 1 (Budgeted Time 1 Min)

Which of the following is the pivot element in the second row of the matrix?

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 8 \\ 0 & 0 & -3 & 5 & 1 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & -3 \end{pmatrix}$$

Answer (Please select your correct option)

0

☐

1

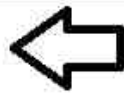
☐

-3

☒

5

☐



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Question No : 3 of 26

Marks: 1 (Budgeted Time 1 Min)

Which of the following is true for the matrix $\begin{pmatrix} 1 & 3 & 2 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{pmatrix}$?

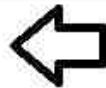
Answer (Please select your correct option)

☐ It is an identity matrix.

☐ It is in reduced echelon form.

☒ It is in echelon form.

☐ It is a rectangular matrix.



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Question No : 4 of 26

Marks: 1 (Budgeted Time 1 Min)

If reduced echelon form of a linear system is $\begin{bmatrix} 1 & 0 & 5 & 5 \\ 0 & 1 & 1 & 6 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ when free variable $x_3 = 0$, then which of the following is true for it?

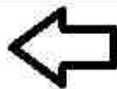
Answer (Please select your correct option)

☐ The particular solution is $(0, 5, 6)$.

☐ The particular solution is $(6, 5, 0)$.

☐ The particular solution is $(5, 6, 0)$.

☐ The particular solution is $(0, 6, 5)$.



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Question No : 5 of 26

Marks: 1 (Budgeted Time 1 Min)

If $\vec{b} = c_1 \vec{u}_1 + c_2 \vec{u}_2$ and $\vec{a} = d_1 \vec{u}_1 + d_2 \vec{u}_2$ where c_1, c_2, d_1 and d_2 are scalars, then which of the following options is correct?

Answer (Please select your correct option)

☐ Only $\vec{b} \in \text{Span}\{\vec{u}_1, \vec{u}_2\}$.

☐ Only $\vec{a} \in \text{Span}\{\vec{u}_1, \vec{u}_2\}$.

☐ Both $\vec{a}, \vec{b} \in \text{Span}\{\vec{u}_1, \vec{u}_2\}$.

☐ Both $\vec{a}, \vec{b} \notin \text{Span}\{\vec{u}_1, \vec{u}_2\}$.



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Question No : 6 of 26

Marks: 1 (Budgeted Time 1 Min)

If a homogeneous system $Ax = 0$ has a trivial solution, then which of the following is (are) the value(s) of the vector x ?

Answer (Please select your correct option)

-1

☐

0

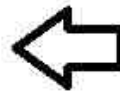
☒

1

☐

2

☐



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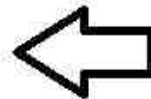
Question No : 7 of 26

Marks: 1 (Budgeted Time 1 Min)

If a homogeneous system $AX = 0$ has non-trivial solution, then which of the following is true for the system?

Answer (Please select your correct option)

- ☐ The system has at least no free variable.
- ☒ The system has at least one free variable.
- ☐ The system has at least two free variables.
- ☐ The system has at least three free variables.



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Question No : 8 of 26

Marks: 1 (Budgeted Time 1 Min)

If $x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -1+6x_3 \\ 3 \\ x_3 \end{bmatrix} = \begin{bmatrix} -1 \\ 3 \\ 0 \end{bmatrix} + x_3 \begin{bmatrix} 6 \\ 0 \\ 1 \end{bmatrix}$ be the general solution of $Ax = b$, then which of the following is parametric equation for the given solution?

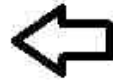
Answer (Please select your correct option)

☐ $p = sx + tu + v$

☐ $x = p + tv$

☐ $v = p + tx$

☐ $tx = p + v$



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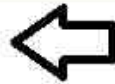
Question No : 9 of 26

Marks: 1 (Budgeted Time 1 Min)

If the equation $T(\vec{x}) = \vec{0}$ has only the trivial solution, then which of the following is true for the linear transformation $T: \mathbb{R}^n \rightarrow \mathbb{R}^m$?

Answer (Please select your correct option)

☐ T is one-to-one.



☐ T is onto.

☐ T is a rotation.

☐ T is a reflection.

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Question No : 10 of 26

Marks: 1 (Budgeted Time 1 Min)

If linear transformation $T: R^n \rightarrow R^m$ is transformed into a matrix A , then which of the following is the order of A ?

Answer (Please select your correct option)

☐ $n \times m$

☐ $m \times m$

☐ $m \times n$

☐ $n \times n$



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If $A = A^t$ (where A is a square matrix) , then which of the following is the most appropriate option for A ?

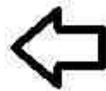
Answer (Please select your correct option)

☐ A is an invertible matrix.

☐ A is a singular matrix.

☐ A is a symmetric matrix.

☐ A is a scalar matrix.



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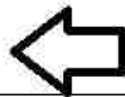
Question No : 12 of 26

Marks: 1 (Budgeted Time 1 Min)

If A is an invertible matrix, then which of the following is true ?

Answer (Please select your correct option)

☐ $(A^{-1})^{-1} = A$



☐ $(A^{-1})^{-1} = \frac{1}{A}$

☐ $(A^{-1})^{-1} = A^{-1}$

☐ $(A^{-1})^{-1} = \det(A)$

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Question No : 13 of 26

Marks: 1 (Budgeted Time 1 Min)

If $A = \begin{bmatrix} 4 & -1 \\ 5 & 3 \end{bmatrix}$, then which of the following is the value of $\det(A)$?

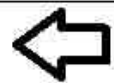
Answer (Please select your correct option)

☐ 7

☐ -17

☒ 17

☐ 11



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Question No : 14 of 26

Marks: 1 (Budgeted Time 1 Min)

If a system of equations is solved using the Jacobi's method, then which of the following is NOT true about the matrix M that is derived from the coefficient matrix?

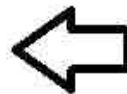
Answer (Please select your correct option)

☐ All of its entries below the diagonal must be zero.

☐ All of its entries above the diagonal must be zero.

☐ It may or may not be invertible.

☐ It is a non-singular matrix.



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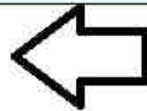
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If the matrix $A = \begin{bmatrix} 5 & 4 \\ 3 & 3 \end{bmatrix}$, then which of the following is the most suitable option for it ?

Answer (Please select your correct option)

☐ It is not strictly diagonally dominant.



☐ It is strictly diagonally dominant.

☐ It is not diagonally dominant.

☐ It is diagonally dominant.

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Question No : 16 of 26

Marks: 1 (Budgeted Time 1 Min)

If $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, then which of the following is the minor of entry a_{21} ?

Answer (Please select your correct option)

2

☐

3

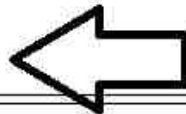
☐

4

☐

5

☐



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Question No : 17 of 26

Marks: 1 (Budgeted Time 1 Min)

If $A = \begin{bmatrix} 4 & 5 \\ 6 & 7 \end{bmatrix}$, then which of the following is the value of C_{21} ?

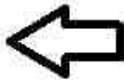
Answer (Please select your correct option)

☐ 5

☒ -5

☐ 6

☐ -6



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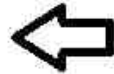
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If the determinant of the matrix $A = \begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 2 \\ 3 & 4 & 5 \end{bmatrix}$ is -1 and the matrix B is obtained by adding 2 times of the second row in the first row of the matrix A , then which of the following is true about the matrix B ?

Answer (Please select your correct option)

- ☐ Its determinant is -1 .
- ☐ Its determinant is 1 .
- ☐ Its determinant can not be evaluated .
- ☐ The information is not sufficient to calculate the determinant .



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Question No : 19 of 26

Marks: 1 (Budgeted Time 1 Min)

If the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 2 \end{bmatrix}$, then which of the following is true about it ?

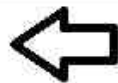
Answer (Please select your correct option)

☐ Its determinant is 0 .

☐ Its determinant is 1 .

☒ Its determinant is 2 .

☐ Its determinant is 4 .



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Question No : 20 of 26

Marks: 1 (Budgeted Time 1 Min)

If a set $S = \{ v_1 = (1, 2), v_2 = (4, 8) \}$, then which of the following is the most appropriate option?

Answer (Please select your correct option)

☐ It is a basis of $\mathbb{R}^2$.

☐ It is linearly independent.

☐ It spans $\mathbb{R}^2$.

☐ It is linearly dependent.



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If $A = \begin{bmatrix} 1 & 2 \\ 3 & 7 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 7 & -2 \\ -3 & 1 \end{bmatrix}$, then calculate the inverse of A^t (if exists).

Answer (Please [click here](#) to Add Answer)



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Question No : 22 of 26

Marks: 2 (Budgeted Time 4 Min)

Evaluate the determinant

$$\begin{vmatrix} 2 & 4 & 8 & 16 \\ 0 & 3 & 6 & 12 \\ 0 & 0 & -2 & -4 \\ 0 & 0 & 0 & -3 \end{vmatrix}.$$

Answer (Please [click here to Add Answer](#))

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Question No : 23 of 26

Marks: 3 (Budgeted Time 6 Min)

If $A = \begin{bmatrix} 1 & 2 \\ 3 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 5 \\ 3 & 4 \end{bmatrix}$, then calculate the inverse of AB (if exists); where $A^{-1} = \begin{bmatrix} 7 & -2 \\ -3 & 1 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 4 & -5 \\ -3 & 4 \end{bmatrix}$.

Answer (Please [click here to Add Answer](#))

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Let S be a parallelogram determined by the vectors $\vec{b}_1 = \begin{bmatrix} -2 \\ 3 \end{bmatrix}$, $\vec{b}_2 = \begin{bmatrix} -2 \\ 5 \end{bmatrix}$ and $A_1 = \begin{bmatrix} 6 & -2 \\ -3 & 2 \end{bmatrix}$. Compute the area of the image of S under the mapping $\vec{x} \rightarrow A_1 \vec{x}$.

Answer (Please [click here](#) to Add Answer)

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Question No : 25 of 26

Marks: 5 (Budgeted Time 10 Min)

Find an LU -decomposition of the matrix $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$.

Answer (Please [click here](#) to Add Answer)

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If $A = \begin{bmatrix} 4 & 1 & 6 \\ -7 & 5 & -3 \\ 9 & -3 & 3 \end{bmatrix}$, then find the minors of first row and determinant of A using these minors.

Answer (Please [click here to Add Answer](#))



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