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Grade **28.00** out of 30.00 (**93**%)

Question 1

Correct

Mark 1.00 out of 1.00

Let $A = \begin{pmatrix} 1 & -1 & 1 \\ 3 & -2 & 2 \\ -2 & 4 & 3 \end{pmatrix}$, then $\det(A) =$

Select one:

○ a. 0

○ b. 9

○ c. 5

◉ d. 7 ✔

The correct answer is: 7

Question 2

Correct

Mark 1.00 out of 1.00

If A is a 2×3-matrix, and $b = a_2$ (second column of A), then a solution to the system $Ax = b$ is

Select one:

○ a. $x = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}$

○ b. $x = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$

○ c. $x = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix}$

◉ d. $x = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$ ✔

The correct answer is: $x = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$

If A is a 2×2 matrix with $\det(A) = -2$. Then $\det(adj(A)) =$

Select one:

○ a. 2.

⦿ b. -2.

✔

○ c. -4.

○ d. 4.

The correct answer is: -2.

If A, B, C are $n \times n$ nonsingular matrices, then $A^2 - B^2 = (A + B)(A - B)$.

Select one:

⦿ a. False ✔

○ b. True

The correct answer is: False

If A is a singular matrix, then A can be written as a product of elementary matrices.

Select one:

⦿ a. False ✔

○ b. True

The correct answer is: False

The adjoint of the matrix $\begin{pmatrix} 5 & 2 \\ -1 & 6 \end{pmatrix}$ is

Select one:

○ a. $\begin{pmatrix} 5 & -1 \\ 2 & 6 \end{pmatrix}$

⦿ b. $\begin{pmatrix} 6 & -2 \\ 1 & 5 \end{pmatrix}$

✔

○ c. $\begin{pmatrix} -5 & -1 \\ 2 & -6 \end{pmatrix}$

○ d. $\begin{pmatrix} -6 & 2 \\ -1 & -5 \end{pmatrix}$

The correct answer is: $\begin{pmatrix} 6 & -2 \\ 1 & 5 \end{pmatrix}$

Question 7

Correct

Mark 1.00 out of 1.00

If A and B are $n \times n$ matrices such that $Ax \neq Bx$ for all nonzero $x \in \mathbb{R}^n$. Then

Select one:

○ a. A and B are singular.

○ b. $A - B$ is singular.

○ c. A and B are nonsingular.

◉ d. $A - B$ is nonsingular.
  ✔

The correct answer is: $A - B$ is nonsingular.

Question 8

Incorrect

Mark 0.00 out of 1.00

If y, z are solutions to $Ax = b$, then $\frac{1}{3}y + \frac{3}{4}z$ is a solution of the system $Ax = b$.

Select one:

○ a. False

◉ b. True ✗

The correct answer is: False

Question 9

Correct

Mark 1.00 out of 1.00

Let A be a 4×4-matrix such that $A \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$, then

Select one:

○ a. There are elementary matrices $E_1, E_2, \cdots, E_k$ such that $A = E_1 E_2 \cdots E_k$

○ b. The system $Ax = 0$ has only one solution

◉ c. A is singular.
  ✔

○ d. A is the zero matrix

The correct answer is: A is singular.

Question 10

Correct

Mark 1.00 out of 1.00

If A is symmetric and skew symmetric then $A = 0$. (A is skew symmetric if $A = -A^T$).

Select one:

○ a. False

◉ b. True ✔

The correct answer is: True

Question 11

Correct

Mark 1.00 out of 1.00

An $n \times n$ matrix A is invertible if and only if

Select one:

- ⦿ a. there exists a matrix B such that $AB = I$

  ✔

- ○ b. $A = I$

- ○ c. $|A| = 0$

- ○ d. $Ax = 0$ has a nonzero solution

The correct answer is: there exists a matrix B such that $AB = I$

Question 12

Correct

Mark 1.00 out of 1.00

If A, B, C are $n \times n$-matrices with A nonsigular and $AB = AC$, then $B = C$

Select one:

- ○ a. False

- ⦿ b. True ✔

The correct answer is: True

Question 13

Correct

Mark 1.00 out of 1.00

In the square linear system $Ax = b$, if A is singular and b is not a linear combination of the columns of A then the system

Select one:

- ○ a. has a unique solution

- ○ b. has infinitely many solutions

- ○ c. can not tell

- ⦿ d. has no solution ✔

The correct answer is: has no solution

Question 14

Correct

Mark 1.00 out of 1.00

Any two $n \times n$-singular matrices are row equivalent.

Select one:

- ⦿ a. False ✔

- ○ b. True

The correct answer is: False

Question 15

Correct

Mark 1.00 out of 1.00

If A is a singular $n \times n$-matrix, $b \in \mathbb{R}^n$, then the system $Ax = b$

Select one:

- ○ a. is inconsistent

- ○ b. has a unique solution

- ⦿ c. has either no solution or an infinite number of solutions ✔

- ○ d. has infinitely many solutions.

The correct answer is: has either no solution or an infinite number of solutions

Let A be a 3×4 matrix which has a row of zeros, and let B be a 4×4 matrix , then AB has a row of zeros.

Select one:
- ⦿ a. True ✔
- ○ b. False

The correct answer is: True

If E is an elementary matrix of type III, then E^T is

Select one:
- ○ a. an elementary matrix of type II
- ○ b. an elementary matrix of type I
- ⦿ c. an elementary matrix of type III ✔
- ○ d. not an elementary matrix

The correct answer is: an elementary matrix of type III

If the row echelon form of $(A|b)$ is $\begin{pmatrix} 1 & 0 & -2 & -1 & | & -2 \\ 0 & 1 & 1 & -1 & | & -1 \\ 0 & 0 & 1 & 1 & | & 0 \end{pmatrix}$ then the general form of the solutions is given by

Select one:
- ○ a. $x = \begin{pmatrix} -2 - \alpha \\ 1 - \alpha \\ \alpha \\ \alpha \end{pmatrix}$

- ○ b. $x = \begin{pmatrix} -2 - \alpha \\ 1 - \alpha \\ \alpha \\ 1 \end{pmatrix}$

- ⦿ c. $x = \begin{pmatrix} -2 - \alpha \\ -1 + 2\alpha \\ -\alpha \\ \alpha \end{pmatrix}$

  ✔

- ○ d. $x = \begin{pmatrix} \alpha \\ 2 - \alpha \\ \alpha \\ \alpha \end{pmatrix}$

The correct answer is: $x = \begin{pmatrix} -2 - \alpha \\ -1 + 2\alpha \\ -\alpha \\ \alpha \end{pmatrix}$

If $(A|b) = \begin{pmatrix} 1 & 1 & 2 & | & 4 \\ 2 & -1 & 2 & | & 6 \\ 0 & 3 & 2 & | & 1 \end{pmatrix}$ is the augmented matrix of the system $Ax = b$ then the system has no solution

Select one:

○ a. False ✘

○ b. True

The correct answer is: True

If $(A|b) = \begin{pmatrix} 1 & 2 & -1 & | & 0 \\ 2 & 3 & 1 & | & -1 \\ 1 & 1 & \alpha & | & \beta \end{pmatrix}$, then the system is inconsistent if

Select one:

○ a. $\alpha \neq 2$ and $\beta \neq -1$

○ b. $\alpha \neq 2$ and β any number

○ c. $\alpha = 2$ and $\beta = -1$

⦿ d. $\alpha = 2$ and $\beta \neq -1$
✔

The correct answer is: $\alpha = 2$ and $\beta \neq -1$

Let $(1, 2, 0)^T$ and $(2, 1, 1)^T$ be the first two columns of a 3×3 matrix A and $(1, 1, 1)^T$ be a solution of the system $Ax = (5, 2, 4)^T$. Then the third column of the matrix A is

Select one:

○ a. $(-2, 1, -3)^T$.

○ b. $(1, -1, -4)^T$.

⦿ c. $(2, -1, 3)^T$.
✔

○ d. $(1, -1, 4)^T$.

The correct answer is: $(2, -1, 3)^T$.

If A is a nonsingular $n \times n$ matrix, then

Select one:

⦿ a. There are elementary matrices $E_1, E_2, \cdots, E_k$ such that $A = E_1 E_2 \cdots E_k$.
✔

○ b. $\det(A) = 1$

○ c. There is a singular matrix C such that $A = CI$.

○ d. The system $Ax = 0$ has a nontrivial (nonzero) solution.

The correct answer is: There are elementary matrices $E_1, E_2, \cdots, E_k$ such that $A = E_1 E_2 \cdots E_k$.

Question 23

Correct

Mark 1.00 out of 1.00

If A is a symmetric $n \times n$-matrix and P any $n \times n$-matrix, then PAP^T is

Select one:
- ⦿ a. symmetric ✔
- ○ b. not defined
- ○ c. singular
- ○ d. not symmetric

The correct answer is: symmetric

Question 24

Correct

Mark 1.00 out of 1.00

If A is an $n \times n$ matrix and the system $Ax = b$ has infinitely many solutions, then

Select one:
- ○ a. A is symmetric
- ○ b. A has a row of zeros
- ⦿ c. A singular
  ✔
- ○ d. A is nonsingular

The correct answer is: A singular

Question 25

Correct

Mark 1.00 out of 1.00

If A is a 3×3 matrix such that $det(A) = 2$, then $\det(3A) = 6$

Select one:
- ⦿ a. False ✔
- ○ b. True

The correct answer is: False

Question 26

Correct

Mark 1.00 out of 1.00

If A, B, C are 3×3-matrices, $\det(A) = 9, \det(B) = 2, \det(C) = 3$, then $\det(3C^T BA^{-1}) =$

Select one:
- ○ a. 6
- ⦿ b. 18
  ✔
- ○ c. 16
- ○ d. 2

The correct answer is: 18

Question 27

Correct

Mark 1.00 out of 1.00

If A and B are singular matrices, then $A + B$ is also singular.

Select one:
- ⦿ a. False ✔
- ○ b. True

The correct answer is: False

In the $n \times n$-linear system $Ax = b$, if A is singular and b is a linear combination of the columns of A then the system has

Select one:

○ a. no solution

○ b. a unique solution

◉ c. infinitely many solutions ✔

○ d. exactly two solutions

The correct answer is: infinitely many solutions

If A is a 4×3-matrix, $b \in \mathbb{R}^4$, and the system $Ax = b$ is consistent, then $Ax = b$ has a unique solution.

Select one:

◉ a. False ✔

○ b. True

The correct answer is: False

If A is a 3×3-matrix and the system $Ax = \begin{pmatrix} 5 \\ 1 \\ 3 \end{pmatrix}$ has a unique solution, then the system $Ax = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$

Select one:

○ a. has infinitely many solutions

◉ b. has only the zero solution. ✔

○ c. is inconsistent

The correct answer is: has only the zero solution.

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