MATHS

BOOKS - TARGET MATHS (HINGLISH)

MATRICES

Classical Thinking 2 1 Elementary Transformations

1. $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} A, R_2 \rightarrow R_2 - 2R_1$gives

A. $\begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix} A$

B. $\begin{bmatrix} 1 & -1 \\ 0 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix} A$

C. $\begin{bmatrix} 1 & -1 \\ 0 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix} A$

D. $\begin{bmatrix} 1 & -1 \\ 0 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} A$

Answer: B

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2. If A= $\begin{bmatrix} 1 & 2 & -1 \\ 3 & -2 & 5 \end{bmatrix}$, then $R_1 \leftrightarrow R_2$ and $C_1 \to C_1 + 2C_3$ given

A. $\begin{bmatrix} -13 & 2 & -5 \\ -1 & 2 & -1 \end{bmatrix}$

B. $\begin{bmatrix} -1 & -2 & -1 \\ 13 & -2 & 5 \end{bmatrix}$

C. $\begin{bmatrix} 13 & -2 & 5 \\ -1 & 2 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 2 & -13 & -5 \\ 2 & -1 & -1 \end{bmatrix}$

Answer: C

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3. the upper triangular matrix of the matrix $\begin{bmatrix} 1 & -1 & 2 \\ 2 & 1 & 3 \\ 3 & 2 & 4 \end{bmatrix}$ is

A. $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 3 & -1 \\ 0 & 0 & \frac{-1}{3} \end{bmatrix}$

B. $\begin{bmatrix} 1 & 1 & -2 \\ 0 & 3 & -1 \\ 0 & 0 & \frac{-1}{3} \end{bmatrix}$

C. $\begin{bmatrix} \frac{-1}{3} & 0 & 0 \\ 3 & -1 & 0 \\ -1 & 2 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 1 & 2 \\ 0 & -3 & -1 \\ 0 & 0 & \frac{-1}{3} \end{bmatrix}$

Answer: A

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4. A square matrix has inverse, if $|A|$ is

A. 0

B. 1

C. -1

D. non zero

Answer: D

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5. If $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$, then minor of $a_{11}(i.e., M_{11})$ is

A. a_{11}

B. a_{12}

C. a_{21}

D. a_{22}

Answer: D

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6. If $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$, then M_{21}=

A. 1

B. -1

C. 2

D. 3

Answer: B

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7. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 2 \\ 0 & 0 & 6 \end{bmatrix}$, then the minor of the element a_{31} is

A. 0

B. -8

C. 4

D. -12

Answer: B

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8. If $A=\begin{bmatrix}1 & 1 & 1 \\ 2 & 1 & -3 \\ -1 & 2 & 3\end{bmatrix}$, then $M_{23}=$

A. 3

B. 4

C. 5

D. -1

Answer: A

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9. The co-factor A_{12} for the matrix $A = \begin{bmatrix} -2 & 3 \\ -3 & 5 \end{bmatrix}$ is

A. 3

B. -3

C. 2

D. -5

Answer: A

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10. If $B = \begin{bmatrix} 2 & 3 \\ -4 & 3 \end{bmatrix}$, then co-factor $a_{21} =$

A. 2

B. -3

C. -4

D. 3

Answer: B

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11. If $A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 2 & 5 \\ 0 & 4 & -1 \end{bmatrix}$, then cofactor A_{32} is

A. -2

B. -8

C. 4

D. 2

Answer: D

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12. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & -3 \\ -1 & 2 & 3 \end{bmatrix}$, then co-factor of 3^{rd} row are

A. $4, \ -5, 1$

B. $-4, 5, \ -1$

C. $-4, 5, 1$

D. $4, 5, \ -1$

Answer: B

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13. If $A \begin{bmatrix} -1 & 5 \\ -3 & 2 \end{bmatrix}$, then adj A=

A. $\begin{bmatrix} 2 & 3 \\ -5 & -1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -5 \\ 3 & -2 \end{bmatrix}$

C. $\begin{bmatrix} 2 & -5 \\ 3 & -1 \end{bmatrix}$

D. $\begin{bmatrix} -2 & 5 \\ -3 & 1 \end{bmatrix}$

Answer: C

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14. The adjoint of matrix $\begin{bmatrix} 1 & -4 \\ 3 & 2 \end{bmatrix}$ is

A. $\begin{bmatrix} 2 & -3 \\ 4 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 2 & -4 \\ 3 & 1 \end{bmatrix}$

C. $\begin{bmatrix} -2 & 3 \\ -4 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 2 & 4 \\ -3 & 1 \end{bmatrix}$

Answer: D

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15. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 3 & 3 & 0 \\ 5 & 2 & -1 \end{bmatrix}$ then, adj A is

A. $\begin{bmatrix} -3 & 0 & 0 \\ 3 & -1 & 0 \\ -9 & 2 & -3 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 0 & -3 \\ 0 & -1 & 3 \\ 3 & -2 & -9 \end{bmatrix}$

C. $\begin{bmatrix} 3 & 0 & 0 \\ -3 & -1 & 0 \\ 9 & 2 & -3 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 0 & 3 \\ 0 & 1 & -3 \\ -3 & 2 & 9 \end{bmatrix}$

Answer: A

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16. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$, then adj A is

A. $\begin{bmatrix} 3 & -9 & -5 \\ -4 & 1 & 3 \\ -5 & 4 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 3 & -4 & -5 \\ -9 & 1 & 4 \\ -5 & 3 & 1 \end{bmatrix}$

C. $\begin{bmatrix} -3 & 4 & 5 \\ 9 & -1 & -4 \\ 5 & -3 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 3 & -9 & -5 \\ 4 & -1 & 3 \\ -5 & 4 & 1 \end{bmatrix}$

Answer: B

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17. If $A = \begin{bmatrix} 4 & 2 \\ 5 & 3 \end{bmatrix}$ then $: |adj(adjA)| =$

A. 1

B. 2

C. 3

D. 4

Answer: B

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18. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$, then: $|A| \cdot |adj. A| =$

A. a^3

B. a^6

C. a^9

D. a^{27}

Answer: C

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19. If $A = \begin{bmatrix} 2 & 3 \\ 4 & 6 \end{bmatrix}$, then $A^{-1} =$

A. $\begin{bmatrix} 1 & 2 \\ -\frac{3}{2} & 2 \end{bmatrix}$

B. $\begin{bmatrix} 2 & -3 \\ 4 & 6 \end{bmatrix}$

C. $\begin{bmatrix} -2 & 4 \\ -3 & 6 \end{bmatrix}$

D. Does not exist

Answer: D

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20. The inverse of the matrix $\begin{bmatrix} 1 & 3 \\ 3 & 10 \end{bmatrix}$ is equal to

A. $\begin{bmatrix} 10 & 3 \\ 3 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 10 & -3 \\ -3 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 3 \\ 3 & 10 \end{bmatrix}$

D. $\begin{bmatrix} -1 & -3 \\ -3 & -10 \end{bmatrix}$

Answer: B

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21. Multiplicative inverse of the matrix $\begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}$ is (i) $\begin{bmatrix} 4 & -1 \\ -7 & -2 \end{bmatrix}$ (ii) $\begin{bmatrix} -4 & -1 \\ 7 & -2 \end{bmatrix}$ (iii) $\begin{bmatrix} 4 & -1 \\ 7 & 2 \end{bmatrix}$ (iv) $\begin{bmatrix} 4 & -1 \\ -7 & 2 \end{bmatrix}$

A. $\begin{bmatrix} 4 & -1 \\ -7 & -2 \end{bmatrix}$

B. $\begin{bmatrix} -4 & -1 \\ 7 & -2 \end{bmatrix}$

C. $\begin{bmatrix} 4 & -7 \\ 7 & 2 \end{bmatrix}$

D. $\begin{bmatrix} 4 & -1 \\ -7 & 2 \end{bmatrix}$

Answer: D

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22. The inverse of the matrix $\begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix}$ is

A. $\begin{bmatrix} \frac{4}{14} & \frac{2}{14} \\ \frac{-1}{14} & \frac{3}{14} \end{bmatrix}$

B. $\begin{bmatrix} \frac{3}{14} & \frac{-2}{14} \\ \frac{1}{14} & \frac{4}{14} \end{bmatrix}$

C. $\begin{bmatrix} \frac{4}{14} & \frac{-2}{14} \\ \frac{1}{14} & \frac{3}{14} \end{bmatrix}$

D. $\begin{bmatrix} \frac{3}{14} & \frac{2}{14} \\ \frac{1}{14} & \frac{4}{14} \end{bmatrix}$

Answer: A

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23. If $A = \begin{bmatrix} a & 0 \\ 0 & \frac{1}{b} \end{bmatrix}$, then $A^{-1} =$

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

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

C. $\begin{bmatrix} \frac{1}{a} & 0 \\ 0 & b \end{bmatrix}$

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

Answer: C

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24. The inverse of the matrix $\begin{bmatrix}1 & 1 & 1\\ 1 & 0 & 2\\ 3 & 1 & 1\end{bmatrix}$ is

A. $\frac{1}{4}\begin{bmatrix}-2 & 0 & 2\\ 5 & -1 & 2\\ 1 & -1 & -2\end{bmatrix}$

B. $\frac{1}{4}\begin{bmatrix}-2 & 0 & 2\\ 5 & -2 & -1\\ 1 & 2 & -1\end{bmatrix}$

C. $\frac{1}{4}\begin{bmatrix}-2 & 0 & 2\\ 2 & 5 & -1\\ -2 & -1 & 1\end{bmatrix}$

D. $\frac{1}{4}\begin{bmatrix}-2 & 0 & 2\\ 5 & -1 & 1\\ 1 & -2 & -1\end{bmatrix}$

Answer: B

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25. The inverse of the matrix $\begin{bmatrix}3 & -2 & -1\\ -4 & 1 & -1\\ 2 & 0 & 1\end{bmatrix}$ is

A. $\begin{bmatrix} 1 & 2 & 3 \\ 3 & 3 & 7 \\ -2 & -4 & -5 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -3 & 5 \\ 7 & 4 & 6 \\ 4 & 2 & 7 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ -2 & -4 & -5 \end{bmatrix}$

D. $\begin{bmatrix} 1 & -3 & 5 \\ 7 & 4 & 6 \\ 4 & 2 & -7 \end{bmatrix}$

Answer: C

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26. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}, \quad \text{then} \quad A^{-1}$, is

A. $\begin{bmatrix} a & 0 & 0 \\ 0 & \frac{1}{b} & 0 \\ 0 & 0 & c \end{bmatrix}$

B. $\begin{bmatrix} \frac{1}{0} & 0 & 0 \\ 0 & \frac{1}{b} & 0 \\ 0 & 0 & c \end{bmatrix}$

C. $\begin{bmatrix} a & 0 & 0 \\ 0 & \frac{1}{b} & 0 \\ 0 & 0 & \frac{1}{c} \end{bmatrix}$

D. $\begin{bmatrix} \frac{1}{a} & 0 & 0 \\ 0 & \frac{1}{b} & 0 \\ 0 & 0 & \frac{1}{c} \end{bmatrix}$

Answer: D

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27. What is the inverse of $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$?

A. $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

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

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

D. $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$

Answer: D

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28. If matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 1 & 2 & -1 \\ 0 & 1 & 1 \end{bmatrix}$ and $A^{-1} = \frac{1}{k}$ adj A, then k is

A. 7

B. -7

C. $\frac{1}{7}$

D. 11

Answer: D

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29. From the matrix equation AB = AC we can conclude B = C provided that

A. A is singular

B. A is non-singular.

C. A is symmetric.

D. A is square

Answer: B

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30. Let A be an inbertible matrix. Which of the following is not true?

A. $(A^T)^{-1} = (A^{-1})^T$

B. $A^{-1} = |A|^{-1}$

C. $(A^2)^{-1} = (A^{-1})^2$

D. $\left|A^{-1}\right| = |A|^{-1}$

Answer: B

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31. If A and B are non-singular matrices, then

A. $(AB)^{-1} = A^{-1}B^{-1}$

B. $AB = BA$

C. $(AB)' = A'B'$

D. $(AB)^{-1} = B^{-1}A^{-1}$

Answer: D

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32. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ and A^{-1} exist and not equal to 0, then $(A^2 - 4A)A^{-1} =$

A. $\begin{bmatrix} -3 & 2 & 2 \\ 2 & -3 & 2 \\ 2 & 2 & -3 \end{bmatrix}$

B. $\begin{bmatrix} 3 & 2 & 2 \\ 2 & 3 & 2 \\ 2 & 2 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 5 & 2 & 0 \\ 2 & 5 & 0 \\ 0 & 2 & 5 \end{bmatrix}$

D. $\begin{bmatrix} 5 & 2 & 5 \\ 2 & 5 & 5 \\ 5 & 5 & 5 \end{bmatrix}$

Answer: A

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Classical Thinking 2 3 Application Of Matrices

1. If $x + 2y = 3$ and $2x + 3y = 4$, then the values of x and y are

A. $1, \ -2$

B. $-2, 1$

C. $-1, 2$

D. $2, \ -1$

Answer: C

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2. 3x-4y+2z=-1

2x+3y+5z=7

x+z=2

A. 3

B. 2

C. 1

D. -2

Answer: A

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3. The value of for which the system of equations $ax+y+z=0, x+ay+z=0, x+y+z=0$ possess a non-null solution is

A. 1

B. 2

C. -1

D. -2

Answer: A

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Classical Thinking Miscellaneous

1. If $A = \begin{bmatrix} i & 0 \\ 0 & \frac{i}{2} \end{bmatrix}$ where $\left(i = \sqrt{-1}\right)$, then $A^{-1} =$

A. $\begin{bmatrix} i & 0 \\ 0 & \frac{i}{2} \end{bmatrix}$

B. $\begin{bmatrix} -i & 0 \\ 0 & -2i \end{bmatrix}$

C. $\begin{bmatrix} i & 0 \\ 0 & 2i \end{bmatrix}$

D. $\begin{bmatrix} 0 & i \\ 2i & 0 \end{bmatrix}$

Answer: B

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2. Which of the following statement is false:

A. If $|A| = 0$, then | ad A| =0

B. Adjoint of a diagonal matrix of order 3×3 is diagonal matrix

C. Product of two upper triangular matrices is a upper triangular matrix

D. $adj(AB) = adj(A)adj(B)$

Answer: D

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Critical Thinking 2 1 Elementary Transformations

1. $$\begin{bmatrix} 1 & 3 & -2 \\ -3 & 0 & -5 \\ 2 & 5 & 0 \end{bmatrix} = A \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$ then,

$C_2 \to C_2 - 3C_1$ and $C_3 \to C_3 + 2C_1$ gives

A. $$\begin{bmatrix} 1 & 0 & 0 \\ 3 & -9 & 11 \\ -2 & 1 & 4 \end{bmatrix} = A \begin{bmatrix} -1 & 3 & 2 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

B. $\begin{bmatrix} 1 & 0 & 0 \\ -3 & -1 & -4 \\ 2 & -9 & 11 \end{bmatrix} = A \begin{bmatrix} 1 & -3 & 2 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 & 0 \\ -3 & 1 & 4 \\ -2 & 9 & -11 \end{bmatrix} = A \begin{bmatrix} -1 & 3 & 2 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 0 & 0 \\ -3 & 9 & -11 \\ 2 & -1 & 4 \end{bmatrix} = A \begin{bmatrix} 1 & -3 & 2 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Answer: D

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2. If $A = \begin{bmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{bmatrix}$ then

$C_2 \to C_2 + 2C_1$ and then $R_1 \to R_1 + R_3$ gives

A. $\begin{bmatrix} 2 & 1 & 3 \\ 2 & 6 & 3 \\ 3 & 4 & 2 \end{bmatrix}$

B. $\begin{bmatrix} 2 & -1 & 3 \\ 2 & 4 & 3 \\ 3 & 1 & 2 \end{bmatrix}$

C. $\begin{bmatrix} 5 & 5 & 5 \\ 3 & 4 & 3 \\ 2 & 6 & 3 \end{bmatrix}$

D. $\begin{bmatrix} 5 & 5 & 5 \\ 2 & 6 & 3 \\ 3 & 4 & 2 \end{bmatrix}$

Answer: D

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3. If $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 2 & 1 & 2 \end{bmatrix}$, then $a_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31} =$

A. 1

B. 2

C. |A|

D. 3

Answer: C

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4. Adjoint of the matrix $N = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ is

A. N

B. 2N

C. $-N$

D. $2N$

Answer: A

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5. If $A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$, then adj (AB) is equal to

A. $\begin{bmatrix} 94 & -39 \\ -82 & 34 \end{bmatrix}$

B. $\begin{bmatrix} 94 & -39 \\ 82 & -34 \end{bmatrix}$

C. $\begin{bmatrix} 94 & -82 \\ -39 & 34 \end{bmatrix}$

D. $\begin{bmatrix} -94 & -39 \\ 82 & 34 \end{bmatrix}$

Answer: A

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6. If $A = \begin{bmatrix} 4 & 2 \\ 3 & 4 \end{bmatrix}, \text{ then: } |adj. A| =$

A. 16

B. 10

C. 6

D. 8

Answer: B

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7. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 9 \\ 1 & 8 & 27 \end{bmatrix}$, then | adj A| is equal to

A. 12

B. 144

C. 72

D. 64

Answer: B

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8. For a invertible matrix A if $A(adjA) = \begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$ then $|A| =$

A. 0

B. 10

C. 20

D. 100

Answer: B

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9. If A is a singular matrix, then adj A is a. singular b. non singular c. symmetric d. not defined

A. singular matrix

B. non-singular matrix

C. symmetric matrix

D. not defined.

Answer: A

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10. If A is a singular matrix of order n, then $A(adjA) =$

A. zero matrix

B. row matrix

C. unit matrix

D. column matrix

Answer: A

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11. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then $adj(adjA)$ is equal to

A. adj A

B. A

C. A^T

D. $-A$

Answer: B

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12. Using elementary transformations, find the inverse of the matrix :

$$\begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$$

A. $\begin{bmatrix} \frac{3}{2} & \frac{6}{2} & \frac{-5}{2} \\ \frac{-15}{2} & \frac{-1}{2} & \frac{1}{2} \\ 5 & -1 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 3 & 6 & 2 \\ -15 & -1 & 1 \\ 5 & -2 & -5 \end{bmatrix}$

C. $\begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$

D. $\begin{bmatrix} \frac{3}{2} & \frac{-1}{2} & \frac{1}{2} \\ \frac{-15}{2} & \frac{6}{2} & \frac{-5}{2} \\ 5 & -1 & 1 \end{bmatrix}$

Answer: C

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13. The inverse of the matrix $A\begin{bmatrix}1 & 1 & 1 \\ 6 & 7 & 8 \\ 6 & 7 & -8\end{bmatrix}$ using adjoint method is

A. $-\frac{1}{16}\begin{bmatrix}-112 & 1 & 15 \\ 96 & -14 & -2 \\ 0 & -1 & 1\end{bmatrix}$

B. $-\frac{1}{16}\begin{bmatrix}-112 & 15 & 1 \\ 96 & -2 & -14 \\ 0 & -1 & 1\end{bmatrix}$

C. $-\frac{1}{16}\begin{bmatrix}-112 & 15 & 1 \\ 96 & -14 & -2 \\ 0 & -1 & 1\end{bmatrix}$

D. $-\frac{1}{16}\begin{bmatrix}112 & 15 & 1 \\ 96 & -14 & -2 \\ -1 & 0 & 1\end{bmatrix}$

Answer: C

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14. If $D = diag[2, 3, 4]$, then $D^{-1} =$

A. O

B. I

C. D

D. diag $\left[\frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right]$

Answer: D

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15. The matrix A satisfying $A\begin{bmatrix}1 & 5 \\ 0 & 1\end{bmatrix} = \begin{bmatrix}3 & -1 \\ 6 & 0\end{bmatrix}$ is

A. $\begin{bmatrix}3 & 2 \\ 6 & -0\end{bmatrix}$

B. $\begin{bmatrix}3 & -16 \\ 6 & -30\end{bmatrix}$

C. $\begin{bmatrix}3 & -16 \\ 6 & 30\end{bmatrix}$

D. $\begin{bmatrix}3 & -3 \\ 6 & 2\end{bmatrix}$

Answer: B

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16. If product of matrix A with $\begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix} is \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$ then A^{-1} is given by

A. $\begin{bmatrix} 0 & -1 \\ 2 & -4 \end{bmatrix}$

B. $\begin{bmatrix} 0 & -1 \\ -2 & -4 \end{bmatrix}$

C. $\begin{bmatrix} 0 & 1 \\ 2 & -4 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 1 \\ -2 & -4 \end{bmatrix}$

Answer: C

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17. If product of matrix A with $\begin{bmatrix} 0 & 1 \\ 2 & -4 \end{bmatrix}$ is $\begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$, then A^{-1} is given by

A. $\begin{bmatrix} 0 & -1 \\ 2 & -4 \end{bmatrix}$

B. $\begin{bmatrix} 0 & -1 \\ -2 & -4 \end{bmatrix}$

C. $\begin{bmatrix} -1 & 3 \\ 6 & -16 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$

Answer: C

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18. if $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix} A \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \text{then} A = ?$

A. $\begin{bmatrix} 7 & 5 \\ -11 & -8 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 7 & 1 \\ 34 & 5 \end{bmatrix}$

D. $\begin{bmatrix} 5 & 3 \\ 13 & 8 \end{bmatrix}$

Answer: A

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19. If the product of the matrix $B = \begin{bmatrix} 2 & 6 & 4 \\ 1 & 0 & 1 \\ -1 & 1 & -1 \end{bmatrix}$ with a matrix A has inverse $C = \begin{bmatrix} -1 & 0 & 1 \\ 1 & 1 & 3 \\ 2 & 0 & 2 \end{bmatrix}$ then $A^{-1} =$

A. $\begin{bmatrix} -3 & -5 & 5 \\ 0 & 9 & 2 \\ 2 & 14 & 6 \end{bmatrix}$

B. $\begin{bmatrix} -3 & 5 & 5 \\ 0 & 0 & 9 \\ 2 & 14 & 16 \end{bmatrix}$

C. $\begin{bmatrix} -3 & -5 & -5 \\ 0 & 9 & 2 \\ 2 & 14 & 6 \end{bmatrix}$

D. $\begin{bmatrix} -3 & -3 & 5 \\ 0 & 9 & 2 \\ 2 & 14 & 6 \end{bmatrix}$

Answer: C

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20. If $P = \begin{bmatrix} 1 & 2 & 4 \\ 3 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, Q = \begin{bmatrix} 1 & -2 & -3 \\ -3 & 1 & 9 \\ 0 & 0 & -5 \end{bmatrix}$ then $(PQ)^{-1}$ equals to

A. zero matrix

B. I_3

C. diag $[-5, -5, -5]$

D. $-\frac{1}{5}I_3$

Answer: D

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21. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -2 \end{bmatrix}$ and $A^{-1} = \alpha A,$ then α is equal to

A. 7

B. -7

C. $\frac{1}{7}$

D. $-\frac{1}{7}$

Answer: C

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22. If matrix $\begin{bmatrix} 1 & 2 & -1 \\ 3 & 4 & 5 \\ 2 & 6 & 7 \end{bmatrix}$ and its inverse is denoted by $A^{-1} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ value of $a_{32} =$

A. $\frac{1}{34}$

B. $\frac{-2}{17}$

C. $\frac{1}{17}$

D. $\frac{-1}{17}$

Answer: d

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23. Show that $A=\begin{bmatrix}5 & 3\\ -1 & -2\end{bmatrix}$ satisfies the equation $x^2-3x-7=0$. Thus, find A^{-1}

A. $\begin{bmatrix}\frac{2}{7} & \frac{3}{7}\\ \frac{-1}{7} & \frac{-5}{7}\end{bmatrix}$

B. $\begin{bmatrix}2 & 3\\ -1 & -5\end{bmatrix}$

C. $\begin{bmatrix}\frac{1}{7} & \frac{1}{7}\\ \frac{-1}{7} & \frac{-5}{7}\end{bmatrix}$

D. $\begin{bmatrix}3 & -1\\ 1 & 2\end{bmatrix}$

Answer: A

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24. If $\begin{bmatrix}x & 1\\ 1 & 0\end{bmatrix}$ and $A^2=I$, then A^{-1} is equal to

A. $\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

Answer: a

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25. If A and B are square matrices of the same order and $AB = 3I$ then A^{-1} is equal to

A. 3B

B. $\frac{1}{3}B$

C. $3B^{-1}$

D. $\frac{1}{3}B^{-1}$

Answer: B

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26. A square non-singular matrix A satisfies $A^2 - A + 2I = 0$, then A^{-1}=

A. $I - A$

B. $\frac{1}{2}(I - A)$

C. $\frac{1}{2}(I + A)$

D. $I + A$

Answer: B

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27. If A is a square matrix such that $|A| \neq 0$ and $m, n(\neq 0)$ are scalars such that $A^2 + mA + nI = 0$, then $A^{-1} =$

A. $-\frac{1}{m}(A+nI)$

B. $-\frac{1}{n}(A+mI)$

C. $-\frac{1}{n}(I+mA)$

D. $\frac{1}{n}(I+mA)$

Answer: b

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28. If a matrix A is such that

$4A^3+2A^2+7A+I=0$, then A^{-1} equals

A. $4A^2+2A+7I$

B. $-(4A^2+2A+7I)$

C. $-(4A^2-2A+7I)$

D. $4A^2+2A-7I$

Answer: b

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Critical Thinking 2 3 Application Of Matrices

1. Use matrix method to solve the equations $5x - 7y = 2$ and $7x - 5y = 3$

A. $x = \frac{11}{24}, y = \frac{1}{24}$

B. $x = \frac{10}{24, y = \frac{5}{24}}$

C. $x = -6, y = -5$

D. $x = 2, y = 1$

Answer: A

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2. Let $X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}, A = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 0 & 1 \\ 3 & 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 \\ 1 \\ 4 \end{bmatrix}$ .If AX=B, then X is equal to

A. $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

B. $\begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$

C. $\begin{bmatrix} -1 \\ -2 \\ 3 \end{bmatrix}$

D. $\begin{bmatrix} -1 \\ -2 \\ -3 \end{bmatrix}$

Answer: B

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3. Let $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} D = \begin{bmatrix} 3 \\ 5 \\ 11 \end{bmatrix}$ and $A = \begin{bmatrix} 1 & -1 & -2 \\ 4 & 1 & 1 \\ 4 & -1 & -2 \end{bmatrix}$, if $X = A^{-1}D$, then X is equal to

A. $\begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}$

B. $\begin{bmatrix} \frac{8}{3} \\ \frac{-1}{3} \\ 0 \end{bmatrix}$

C. $\begin{bmatrix} \frac{-8}{3} \\ 1 \\ 0 \end{bmatrix}$

D. $\begin{bmatrix} \frac{8}{3} \\ \frac{1}{3} \\ -1 \end{bmatrix}$

Answer: b

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4. If $n \neq 3k$ and $1, \omega, \omega^2$ are the cube roots of units , then $\Delta = \Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^{2n} & 1 & \omega^n \\ \omega^n & \omega^{2n} & 1 \end{vmatrix}$ has the value

A. 0

B. ω

C. ω^2

D. 1

Answer: a

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5. The inverse of $\begin{bmatrix} 1 & \sin\alpha \\ -\sin\alpha & -1 \end{bmatrix}$ is

A. $\begin{bmatrix} 1 & -\sin\alpha \\ -\sin\alpha & -1 \end{bmatrix}$

B. $-\sec^2\begin{bmatrix} 1 & -\sin\alpha \\ \sin\alpha & -1 \end{bmatrix}$

C. $\sec^2\alpha\begin{bmatrix} 1 & \sin\alpha \\ -\sin\alpha & -1 \end{bmatrix}$

D. $\cos^2\alpha\begin{bmatrix} 1 & \sin\alpha \\ -\sin\alpha & -1 \end{bmatrix}$

Answer: c

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Competitive Thinking Inverse Off A Matrix

1. $A=\begin{bmatrix}2 & -2\\ -2 & 2\end{bmatrix}, B=\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}$ then

A. $A^{-1}=B$

B. B^{-1} does not exist

C. A^{-1} does not exist

D. Both (B) and (C)

Answer: d

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2. If $A=\begin{bmatrix}1 & \lambda & 2\\ 1 & 2 & 5\\ 2 & 1 & 1\end{bmatrix}$ is not invertible then λ=?

A. 2

B. 1

C. 0

D. -1

Answer: b

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3. Matrix $A = \begin{bmatrix} 1 & 0 & -k \\ 2 & 1 & 3 \\ k & 0 & 1 \end{bmatrix}$ is invertible for

A. $k = 1$

B. $k = -1$

C. $k = 0$

D. All real k

Answer: D

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4. The matrix $\begin{bmatrix} \lambda & -1 & 4 \\ -3 & 0 & 1 \\ -1 & 1 & 2 \end{bmatrix}$ is invertible if

A. $\lambda \neq -15$

B. $\lambda \neq -17$

C. $\lambda \neq -16$

D. $\lambda \neq -18$

Answer: b

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5. IF the inverse of the matrix $\begin{bmatrix} \alpha & 14 & -1 \\ 2 & 3 & 1 \\ 6 & 2 & 3 \end{bmatrix}$ does not exist then the value of α is

A. 1

B. -1

C. 0

D. -2

Answer: d

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6. IF $A = \begin{bmatrix} 1 & 1 & 0 \\ 2 & 1 & 5 \\ 1 & 2 & 1 \end{bmatrix}$, then $a_{11}A_{21} + a_{12} + a_{12}A_{22} + a_{13}A_{23}$ =

A. 1

B. 0

C. -1

D. 2

Answer: b

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7. Matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 5 \\ 2 & 4 & 7 \end{bmatrix}$, then the value of $a_{31}A_{31} + a_{32}A_{32} + a_{33}A_{33}$ is

A. 1

B. 13

C. -1

D. -13

Answer: c

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8. If $X = \begin{bmatrix} -x & -y \\ z & t \end{bmatrix}$, then transpose of adjX is

A. $\begin{bmatrix} t & z \\ -y & -x \end{bmatrix}$

B. $\begin{bmatrix} t & y \\ -z & -x \end{bmatrix}$

C. $\begin{bmatrix} t & -z \\ y & -x \end{bmatrix}$

D. None of these

Answer: c

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9. Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 5 & 2 & 0 \\ -1 & 6 & 1 \end{bmatrix}$, then the adjoint of A is

A. $\begin{bmatrix} 2 & -5 & 32 \\ 0 & 1 & -6 \\ 0 & 0 & 2 \end{bmatrix}$

B. $\begin{bmatrix} -1 & 0 & 0 \\ -5 & -2 & 0 \\ 1 & -6 & 1 \end{bmatrix}$

C. $\begin{bmatrix} -1 & 0 & 0 \\ -5 & -2 & 0 \\ 1 & -6 & -1 \end{bmatrix}$

D. None of these

Answer: d

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10. if $A = \begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix}$ then $(3A^2 + 12A) = ?$

A. $\begin{bmatrix} 72 & -63 \\ -84 & 51 \end{bmatrix}$

B. $\begin{bmatrix} 72 & -84 \\ -63 & 51 \end{bmatrix}$

C. $\begin{bmatrix} 51 & 63 \\ 84 & 72 \end{bmatrix}$

D. $\begin{bmatrix} 51 & 84 \\ 63 & 72 \end{bmatrix}$

Answer: C

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11. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 0 & 2 & -3 \\ 2 & 1 & 0 \end{bmatrix}$, $B = (adjA)$ and $C = 5A$, then $\dfrac{|adjB|}{|C|} =$

A. 5

B. 25

C. -1

D. 1

Answer: D

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12. If $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$, then what is A (adj A) equal to ?

A. $\begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 10 \\ 10 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 10 & 1 \\ 1 & 10 \end{bmatrix}$

D. None of these

Answer: a

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13. If $A = \begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$, then $A(adjA) =$

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

D. $\begin{bmatrix} -2 & 0 \\ 0 & -2 \end{bmatrix}$

Answer: a

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14. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ and A. adj $A = \begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$, then k is equal to

A. 0

B. 1

C. $\sin\alpha \cos\alpha$

D. $\cos 2\alpha$

Answer: b

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15. If k is a scalar and l is a unit matrix of order 3 then $adj(kl)$ is equal to

A. $k^3 I$

B. $k^2 I$

C. $-k^3 I$

D. $-k^2 I$

Answer: b

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16. If x is square materix of order 3×3 and λ is a scalar, then adj (λX) is equal to

A. $\lambda adj X$

B. $\lambda^3 adj X$

C. $\lambda^2 adj X$

D. $\lambda^4 adj X$

Answer: c

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17. If A is a singular matrix, then adj A is a. singular b. non singular c. symmetric d. not defined

A. singular

B. non-singular

C. symmetric

D. not defined

Answer: a

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18. If d is the determinant of a square matrix A of order n , then the determinant of its adjoint is d^n (b) d^{n-1} (c) d^{n+1} (d) d

A. d^n

B. d^{n-1}

C. d^{n+1}

D. d

Answer: b

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19. If $A = \begin{bmatrix} 4 & 2 \\ 3 & 4 \end{bmatrix}, \quad \text{then:} \quad |adj, A| =$

A. 16

B. 10

C. 6

D. None of these

Answer: b

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20. For a invertible matrix A if $A(adjA) = \begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$ then $|A| =$

A. 100

B. -100

C. 10

D. -10

Answer: c

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21. If A is a matrix of order 3, such that $A(adjA) = 10I$, then $|adjA| =$

A. 1

B. 10

C. 100

D. 101

Answer: c

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22. If the adjoint of a 3 3 matrix P is 1 4 4 2 1 7 1 1 3 , then the possible value(s) of the determinant of P is (are) (A) 2 (B) 1 (C) 1 (D) 2

A. ± 2

B. ± 1

C. ± 3

D. ± 4

Answer: a

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23. Let A be a 2×2 matrix

Statement -1 adj $(adjA) = A$

Statement-2 $|adjA| = |A|$

A. Statement -1 is true , Statement -2 is true ,

Statement -2 is a correct explanation for Statement -1

B. Statement -1 is true , Statement -2 is true,

Statement -2 is not a correct explanation for Statement -1

C. Statement-1 is true , Statement -2 is false

D. Statement -1 is false , Statement -2 is true

Answer: b

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24. $adjAB - (adjB)(adjA) =$

A. $adjA - adjB$

B. 1

C. 0

D. non of these

Answer: c

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25. If $A = \begin{bmatrix} 2x & 0 \\ x & x \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$ then x equals to

A. 2

B. $\frac{1}{2}$

C. 1

D. 3

Answer: b

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26. If $A = \begin{bmatrix} x & -2 \\ 3 & 7 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} \frac{7}{34} & \frac{1}{17} \\ \frac{-3}{34} & \frac{2}{17} \end{bmatrix}$,then the value of x is

A. 2

B. 3

C. -4

D. 4

Answer: d

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27. Let $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ and $10B = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$. If B is the inverse of A, then α is :

A. 0

B. 1

C. 2

D. 5

Answer: b

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28. If $A = \begin{bmatrix} 5 & 4 \\ 3 & 2 \end{bmatrix}$ then A^{-1} is equal to

A. $\frac{1}{2}\begin{bmatrix} -2 & 4 \\ 3 & 5 \end{bmatrix}$

B. $\frac{1}{2}\begin{bmatrix} 5 & 3 \\ 4 & 2 \end{bmatrix}$

C. $\frac{1}{2}\begin{bmatrix} 5 & -4 \\ -3 & 2 \end{bmatrix}$

D. $-\frac{1}{2}\begin{bmatrix} 2 & -4 \\ -3 & 5 \end{bmatrix}$

Answer: d

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29. The inverse of matrix $A = \begin{bmatrix} 2 & -3 \\ -4 & 2 \end{bmatrix}$ is

A. $\frac{-1}{8}\begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix}$

B. $\frac{-1}{8}\begin{bmatrix} 3 & 2 \\ 2 & 4 \end{bmatrix}$

C. $\frac{1}{8}\begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix}$

D. $\frac{1}{8}\begin{bmatrix} 3 & 2 \\ 2 & 4 \end{bmatrix}$

Answer: a

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30. If U= $\begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{-1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{bmatrix}$, then U^{-1} is

A. U^T

B. U

C. I

D. 0

Answer: a

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31. If A $= \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then A^{-1} = ____.

A. $\dfrac{1}{ab - cd}\begin{bmatrix} b & -c \\ -d & a \end{bmatrix}$

B. $\dfrac{1}{ad - bc}\begin{bmatrix} b & -c \\ -d & a \end{bmatrix}$

C. $\dfrac{1}{ab - cd}\begin{bmatrix} b & d \\ c & a \end{bmatrix}$

D. None of these

Answer: a

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32. The invrse of the matrix $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ is

A. $\frac{1}{24}\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

C. $\frac{1}{24}\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{4} \end{bmatrix}$

Answer: d

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33. If $A = \begin{bmatrix} \frac{k}{2} & 0 & 0 \\ 0 & \frac{l}{2} & 0 \\ 0 & 0 & \frac{m}{4} \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{4} \end{bmatrix}$ then $k + l + m =$

A. 1

B. 9

C. 14

D. 29

Answer: D

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34. What is the inverse of $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$?

A. A

B. A^T

C. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$

Answer: A

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35. If $A = \begin{bmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{bmatrix}$, then A^{-1} is

A. A^T

B. A^2

C. A

D. I

Answer: a

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36. The inverse of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 3 & 3 & 0 \\ 5 & 2 & -1 \end{bmatrix}$ is

A. $-\frac{1}{3}\begin{bmatrix} -3 & 0 & 0 \\ 3 & 1 & 0 \\ 9 & 2 & -3 \end{bmatrix}$

B. $-\frac{1}{3}\begin{bmatrix} -3 & 0 & 0 \\ 3 & -1 & 0 \\ -9 & -2 & 3 \end{bmatrix}$

C. $-\frac{1}{3}\begin{bmatrix} 3 & 0 & 0 \\ -3 & -1 & 0 \\ -9 & -2 & 3 \end{bmatrix}$

D. $-\frac{1}{3}\begin{bmatrix} -3 & 0 & 0 \\ -3 & -1 & 0 \\ -9 & -2 & 3 \end{bmatrix}$

Answer: b

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37. The inverse matrix of $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$ is

A. $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ -4 & 3 & -1 \\ \frac{5}{2} & \frac{-3}{2} & \frac{1}{2} \end{bmatrix}$

B. $\begin{bmatrix} \frac{1}{2} & -4 & \frac{5}{2} \\ 1 & -6 & 3 \\ 1 & 2 & -1 \end{bmatrix}$

C. $\frac{1}{2}\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 4 & 2 & 3 \end{bmatrix}$

D. $\frac{1}{2}\begin{bmatrix} 1 & -1 & -1 \\ -8 & 6 & -2 \\ 5 & -3 & 1 \end{bmatrix}$

Answer: a

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38. The inverse of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & c & 1 \end{bmatrix}$ is (A) $\begin{bmatrix} 1 & 0 & 0 \\ -a & 1 & 0 \\ b & c & 1 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 0 & 0 \\ -a & 1 & 0 \\ ac & b & 1 \end{bmatrix}$ (C) $\begin{bmatrix} 1 & -a & ac-b \\ -0 & 1 & -c \\ 0 & 0 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & 0 & 0 \\ -a & 1 & 0 \\ ac-b & -c & 1 \end{bmatrix}$

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

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

C. $\begin{bmatrix} 1 & 0 & 0 \\ -a & 1 & 0 \\ ac-b & -c & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & -a & ac-b \\ 0 & 1 & -c \\ 0 & 0 & 1 \end{bmatrix}$

Answer: c

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39. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then $A^{-1} =$

A. A

B. A^2

C. A^3

D. A^4

Answer: c

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40. if $A = [a_{ij}]_{2\cdot 2}$ where $a_{ij} = \{i + j, i \neq j$ and $a_{ij} = i^2 - 2j, i = j$ then A^{-1} is equal to

A. $\frac{1}{9}\begin{bmatrix} 4 & 1 \\ -1 & 2 \end{bmatrix}$

B. $\frac{1}{9}\begin{bmatrix} 0 & -3 \\ -3 & -1 \end{bmatrix}$

C. $\frac{1}{9}\begin{bmatrix} 0 & 3 \\ 3 & 1 \end{bmatrix}$

D. None of these

Answer: c

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41. The element of second row and third column in the inverse of $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix}$ is

A. -2

B. -1

C. 1

D. 2

Answer: b

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42. The element in the first row and third column of the inverse of the matrix $\begin{bmatrix} 1 & 2 & -3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$ is

A. -2

B. 0

C. 1

D. 7

Answer: d

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43. If $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$, then the sum of the all the diagonal entries of A^{-1} is

A. 2

B. 3

C. -3

D. 4

Answer: d

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44. If matrix $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$ such that $Ax = I$ then x=

A. $\frac{1}{5}\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$

B. $\frac{1}{5}\begin{bmatrix} 4 & 2 \\ 4 & -1 \end{bmatrix}$

C. $\frac{1}{5}\begin{bmatrix} -3 & 2 \\ 4 & -1 \end{bmatrix}$

D. $\frac{1}{5}\begin{bmatrix} -1 & 2 \\ -1 & 4 \end{bmatrix}$

Answer: c

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45. The matrix A satisfying $A\begin{bmatrix}1 & 5\\0 & 1\end{bmatrix}=\begin{bmatrix}3 & -1\\-1 & 4\end{bmatrix}$ is

A. $\begin{bmatrix}3 & 2\\6 & -3\end{bmatrix}$

B. $\begin{bmatrix}3 & -16\\6 & -30\end{bmatrix}$

C. $\begin{bmatrix}3 & -16\\6 & 30\end{bmatrix}$

D. $\begin{bmatrix}3 & -3\\6 & 2\end{bmatrix}$

Answer: b

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46. If $A=\begin{bmatrix}3 & 2\\0 & 1\end{bmatrix} then: \left(A^{-1}\right)^3=$

A. $\frac{1}{27}\begin{bmatrix}1 & -26\\0 & 27\end{bmatrix}$

B. $\frac{1}{27}\begin{bmatrix}-1 & 26\\0 & 27\end{bmatrix}$

C. $\frac{1}{27}\begin{bmatrix}1 & -26\\ 0 & -27\end{bmatrix}$

D. $\frac{1}{27}\begin{bmatrix}-1 & -26\\ 0 & -27\end{bmatrix}$

Answer: a

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47. A= $\begin{bmatrix}0 & 3\\ 2 & 0\end{bmatrix}$ and $A^{-1} = \lambda$ (adj, A) then λ is equal to

A. $\frac{-1}{6}$

B. $\frac{1}{3}$

C. $\frac{-1}{3}$

D. $\frac{1}{6}$

Answer: a

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48. Let

$A = [1000110 - 24], I = [100010001] and A^{-1} = \left[\frac{1}{6}(A^2 + cA + dI)\right]$.

Then value of $c and d$ are a.$(= 6, -11)$ b. $(6, 11)$ c. $(-6, 11)$ d. $(6, -11)$

A. $(6, 11)$

B. $(6, -11)$

C. $(-6, 11)$

D. $(-6, -11)$

Answer: c

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49. If I_3 is identity matrix of order 3, then $I_3^{-1} =$

A. 0

B. $3I_3$

C. I_3

D. does not exist

Answer: c

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50. If for the matrix A, $A^3 = I$, then $A^{-1} =$ A^2 (b) A^3 (c) A (d) none of these

A. A^2

B. A^3

C. A

D. None of these

Answer: a

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51. If $A^2 - A + I = 0$ then A^{-1} is equal to

A. A^{-2}

B. $A + 1$

C. $I - A$

D. $A - I$

Answer: c

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52. If A and B are two square matrices such that $B = -A^{-1}BA$, then $(A + B)^2$ is equal to

A. 0

B. $A^2 + B^2$

C. $A^2 + 2AB + B^2$

D. $A + B$

Answer: B

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53. If A and B are square matrices of the same order and A is non-singular, then for a positive integer n, $\left(A^{-1}BA\right)^n$ is equal to

A. $A^{-n}B^nA^n$

B. $A^nB^nA^{-n}$

C. $A^{-1}B^nA$

D. $n\left(A^{-1}BA\right)$

Answer: C

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54. Let for any matrix M, M^{-1} exists, which of the followint is not true?

A. $(M^{-1}) = (M)^{-1}$

B. $(M^2)^{-1} = (M^{-1})^2$

C. $(M^{-1})^{-1} = (M^{-1})^1$

D. $(M^{-1})^{-1} = M$

Answer: c

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55. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ then $(B^{-1}A^{-1})^{-1}$ is equal to

A. $\begin{bmatrix} 2 & -2 \\ 2 & 3 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 2 \\ -2 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 2 & -3 \\ 2 & 2 \end{bmatrix}$

D. $\begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$

Answer: a

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56. IF $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$ then $\left(A^2 - 5A\right)A^{-1} =$

A. $\begin{bmatrix} 4 & 2 & 3 \\ -1 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix}$

B. $\begin{bmatrix} -4 & 2 & 3 \\ -1 & -4 & 2 \\ 1 & 2 & -1 \end{bmatrix}$

C. $\begin{bmatrix} -4 & -1 & 1 \\ 2 & -4 & 2 \\ 3 & 2 & -1 \end{bmatrix}$

D. $\begin{bmatrix} -1 & -2 & 1 \\ 4 & -2 & -3 \\ 1 & 4 & -2 \end{bmatrix}$

Answer: b

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57. If $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$, then the values of x and respectively are

A. $-3, \ -1$

B. $1, 3$

C. $3, 1$

D. $-1, 3$

Answer: d

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58. If $\begin{bmatrix} 1 & 2 & -3 \\ 0 & 4 & 5 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, then (x, y, z) is equal to

A. $(1, 6, 6)$

B. $(1, -6, 6)$

C. $(1, 1, 6)$

D. $(6, -1, 1)$

Answer: d

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59. The solutiion of (x, y, z) the equation $\begin{bmatrix} -1 & 0 & 1 \\ -1 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$ is (x, y, z)

A. $(1, 1, 1)$

B. $(0, -1, 2)$

C. $(-1, 2, 2)$

D. $(-1, 0, 2)$

Answer: d

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60. If $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -2 & -2 \\ 1 & 3 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 3 \\ 4 \end{bmatrix}$, then $\begin{bmatrix} x \\ y \\ z \end{bmatrix}$ is equal to

A. $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$

C. $\begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}$

Answer: d

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61. If $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 4 \\ 1 & 3 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 12 \\ 15 \\ 13 \end{bmatrix}$, then the values of x, y, z respectively are

A. $1, 2, 3$

B. $3, 2, 1$

C. $2, 2, 1$

D. $1, 1, 2$

Answer: b

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62. Let M be a 3×3 matrix satisfying $M[010] = M[1 - 10] = [11 - 1], and M[111] = [0012]$ Then the sum of the diagonal entries of M is ________.

A. 7

B. 8

C. 9

D. 6

Answer: c

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63. Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$, and U_1, U_2 and U_3 are columns of a 3×3 matrix U. If column matrices U_1, U_2 and U_3 satisfy

$AU_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, AU_2 = \begin{bmatrix} 2 \\ 3 \\ 0 \end{bmatrix}, AU_3 = \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$ then the sum of the elements of the matrix U^{-1} is

A. 6

B. 0(zero)

C. 1

D. $2/3$

Answer: b

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64. If $A = \begin{bmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$, where A_{11}, A_{12}, A_{13} are co-factores of a_{11}, a_{12}, a_{13} respectively , then the value of $a_{11}A_{11} + a_{12}A_{12} + a_{13} =$

A. -1

B. 1

C. 0

D. $\frac{1}{2}$

Answer: b

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65. If $A = \begin{bmatrix} 1 & \tan\left(\frac{\theta}{2}\right) \\ -\tan\left(\frac{\theta}{2}\right) & 1 \end{bmatrix}$ and $AB = I, thenB =$ (A) $\left\{\cos^2\left(\frac{\theta}{2}\right)\right\}A$ (B) $\left\{\cos^2\left(\frac{\theta}{2}\right)\right\}A'$ (C) $\left\{\cos^2\left(\frac{\theta}{2}\right)\right\}I$ (D) none of these

A. $\cos^2\frac{\theta}{2}.\ A$

B. $\cos^2\frac{\theta}{2}.\ A^T$

C. $\cos^2\frac{\theta}{2}.\ I$

D. None of these

Answer: b

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66. Let $F(\alpha) = [\cos\alpha - s \in \alpha 0s \in \alpha \cos\alpha 0001], where\alpha \in R.$ Then $(F(\alpha))^{-1}$ is equal to $F(\alpha^{-1})$ b. $F(-\alpha^{\square})$ c. $F(2\alpha)$ d. $-[1110]$

A. $F(-\alpha)$

B. $f(\alpha^{-1})$

C. $F(2\alpha)$

D. None of these

Answer: a

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67. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then A^{-1} is

A. $B(\alpha)$

B. $B(-\alpha)$

C. $B(2\alpha)$

D. $B(-2\alpha)$

Answer: c

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68. If A is an $3x3$ non-singular matrix such that $\forall' - A' AandB = A^{-1}A'$, then BB' equals: B^{-1} (b) $(B^{-1})'$ (c) $I + B$ (d) I

A. B^{-1}

B. (B^{-1})

C. $1+B$

D. 1

Answer: d

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69. Let $MandN$ be two 3×3 non singular skew-symmetric matrices such that $MN=NM$. If P^T denote the transpose of P, then $M^2N^2(M^TN^{-1})^T$ is equal to M^2 b. $-N^2$ c. $-M^2$ d. MN

A. M^2

B. $-N^2$

C. $-M^2$

D. MN

Answer: c

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Evaluation Test

1. If A and adj A are non-singular square matrices of order n, then adj $(A^{-1}) =$

A. $(adjA)^T$

B. $adj(adj(A))$

C. $\frac{1}{|A|}A$

D. $|A| \cdot A$

Answer: C

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2. If $A\begin{bmatrix}1 & 2 & 2\\ -2 & -1 & -1\\ 1 & -4 & -4\end{bmatrix}$, then the sum of the elements of A^{-1} is

A. 0

B. 1

C. -1

D. 3

Answer: a

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3. If $A\begin{bmatrix}2 & 0 & 3\\ 1 & -1 & 2\\ 3 & -2 & 0\end{bmatrix}$, then $(adjA)A =$

A. $\begin{bmatrix}-11 & 0 & 0\\ 0 & -11 & 0\\ 0 & 0 & -11\end{bmatrix}$

B. $\begin{bmatrix}11 & 0 & 0\\ 0 & 11 & 0\\ 0 & 0 & 11\end{bmatrix}$

C. $\begin{bmatrix} 17 & 0 & 0 \\ 0 & 17 & 0 \\ 0 & 0 & 17 \end{bmatrix}$

D. $\begin{bmatrix} -7 & 0 & 0 \\ 0 & -7 & 0 \\ 0 & 0 & -7 \end{bmatrix}$

Answer: b

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4. The inverse of $\begin{bmatrix} 1 & 2 & 4 \\ 3 & -19 & 7 \\ 2 & 4 & 8 \end{bmatrix}$ is

A. $\begin{bmatrix} 1 & 1 & 1 \\ 3 & 9 & 7 \\ 2 & 1 & 8 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 1 & 1 \\ 19 & 7 & 8 \\ 2 & 1 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 3 & 1 & 4 \\ 1 & 2 & 3 \\ 4 & 5 & 8 \end{bmatrix}$

D. does not exist

Answer: d

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5. If $\begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix}\begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$, then

A. $a = \cos 2\theta, b = \sin 2\theta$

B. $a = 1, b = 1$

C. $a = \sin 2\theta, b = \cos 2\theta$

D. $a = \sec 2\theta, b = \tan 2\theta$

Answer: a

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6. If $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 1 \\ 3 & 2 & 9 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ 7 \\ 14 \end{bmatrix}$, then the values of x, y, z respectively are

A. $1, 2, 3$

B. $1, 1, 1$

C. $2, 2, 2$

D. $3, 2, 1$

Answer: b

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7. The value of λ for which the matrix $\begin{bmatrix} 1 & -2 & -1 \\ 2 & \lambda & 3 \\ -1 & 0 & 3 \end{bmatrix}$ will not be invertible ,

A. -9

B. $\frac{9}{2}$

C. 9

D. $\frac{-9}{2}$

Answer: a

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8. If $A = \begin{bmatrix} x & 2 & 3 \\ -1 & 5 & 3 \end{bmatrix}$,$B = \begin{bmatrix} 1 & -2 & y \\ 1 & z & -2 \end{bmatrix}$ and $C = \begin{bmatrix} 3 & 0 & 1 \\ 0 & 2 & 1 \end{bmatrix}$,
also $A + B - C = O$ then find x, y, z

A.

B.

C.

D.

Answer:

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9. If $A=\begin{bmatrix}1 & 3\\ 2 & 4\end{bmatrix}$ and $(AB)^{-1}=\begin{bmatrix}\frac{-1}{2} & \frac{1}{2}\\ \frac{1}{4} & 0\end{bmatrix}$, then $B^{-1}.\ A^{-1}=$

A. $\begin{bmatrix}\frac{-5}{8} & \frac{1}{8}\\ \frac{3}{8} & \frac{1}{8}\end{bmatrix}$

B. $\begin{bmatrix}-1 & 1\\ 3 & 5\end{bmatrix}$

C. $\begin{bmatrix}\frac{-1}{2} & \frac{1}{4}\\ \frac{1}{2} & 0\end{bmatrix}$

D. $\begin{bmatrix}\frac{-1}{2} & \frac{1}{2}\\ \frac{1}{4} & 0\end{bmatrix}$

Answer: d

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10. If $A=\begin{bmatrix}1 & 4 & 4\\ 4 & 1 & 4\\ 4 & 4 & 1\end{bmatrix}$ and A^{-1} exists and not equal to zero ,then $(A^2-8A)A^{-1}$=

A. $\begin{bmatrix} 7 & 4 & 4 \\ 4 & 7 & 4 \\ 4 & 4 & 7 \end{bmatrix}$

B. $\begin{bmatrix} 9 & 4 & 4 \\ 4 & 4 & 9 \\ 9 & 4 & 4 \end{bmatrix}$

C. $\begin{bmatrix} -7 & 4 & 4 \\ 4 & -7 & 4 \\ 4 & 4 & -7 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 9 & 4 \\ 4 & 0 & 9 \\ 9 & 4 & 0 \end{bmatrix}$

Answer: c

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11. If $A = \begin{bmatrix} 1 & 2 & 0 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$ then det$(Adj(AdjA)) =$ (A) 13 (B) 13^2

(C) 13^4 (D) none of these

A. 13

B. 13^2

C. 13^3

D. 13^4

Answer: d

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12. If A is a square matrix such that $A(adjA) = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{bmatrix}$, then $\frac{|adj(adjA)|}{|adjA|}$ is equal to

A. 256

B. 16

C. 32

D. 64

Answer: b

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13. If M be a 3×3 non-singular matrix with $\det(M) = \alpha$.If $M^{-1}adj(adjA) = KI$, then the value of K is

A. 1

B. α

C. α^2

D. α^3

Answer: b

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