MATHS

BOOKS - PEARSON IIT JEE FOUNDATION

MATRICES

Example

1. If $A = \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 1 \\ 4 & -2 \end{bmatrix}$, then find A-B.

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2. If $A = \begin{bmatrix} 2 & 3 & -1 \\ 5 & 6 & 1 \end{bmatrix}$, then find

(a) -A , (b)3A , (c) $\frac{1}{4}A$.

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3. Let $A = \begin{bmatrix} 2 & -1 \\ 1 & 7 \\ 3 & 5 \end{bmatrix}_{3\times 2}$ and $\begin{bmatrix} -5 & 6 & 4 \\ 9 & 11 & 8 \end{bmatrix}_{2\times 3}$ Find AB

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4. Let $A = \begin{bmatrix} -3 & 1 \\ 0 & 2 \end{bmatrix} B = \begin{bmatrix} 2 & -1 \\ 0 & 1 \end{bmatrix}$ Then prove

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5. Let, $A - \begin{bmatrix} 2 & 4 \\ 4 & 8 \end{bmatrix}, B - \begin{bmatrix} 8 & -12 \\ -4 & 6 \end{bmatrix}$, then

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6. Let $A\begin{bmatrix}5 & 10\\10 & 20\end{bmatrix}, \begin{bmatrix}10 & 5\\15 & 10\end{bmatrix}$ and $= \begin{bmatrix}-10 & 35\\25 & -5\end{bmatrix}$. Prove that AB = AC but $B \neq C$

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7. Prove that AI=IA=A, for

$A\begin{bmatrix}2 & -1\\4 & 3\end{bmatrix}, I = \begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$

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Test Your Concepts Very Short Answer Type Questions

1. What is the order of matrix $\begin{bmatrix}7 & 1 & 2\\6 & 2 & 2\end{bmatrix}$?

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Test Your Concepts Very Short Answer Type Questions

1. For a matrix $\begin{bmatrix} 4 & 1 & 2 \\ 2 & 4 & 3 \\ 5 & 8 & 6 \end{bmatrix}$ what is the second row and third column element ?

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2. Trace of a scalar matrix of order 4×4 whose one of the principal diagonal elements is 4 is _____ .

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3. If order of matrix A is 4×3 and AB is 4×5, then the order of matrix B is _____ .

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4. Two matrices $A = \begin{bmatrix} 2 & 3 \\ 5 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} x & 3 \\ 5 & -3-y \end{bmatrix}$ are equal, then x+y is _____ .

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5. If $A = \begin{bmatrix} 10 & 8 \\ -6 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -3 \\ 5 & 0 \end{bmatrix}$ then find A+B.

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6. If $A = \begin{bmatrix} 12 & 7 \\ 9 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 8 & 10 \\ -2 & -5 \end{bmatrix}$, then find (A-B).

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7. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$, then A^T = _____ .

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8. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then kA (where 'k' is a scalar) = _____.

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9. If $A = \begin{bmatrix} a & p \\ b & q \\ c & r \end{bmatrix}$, then $\left(A^T\right)^T$ = _____ .

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10. The order of matrix $A + B^T$ is 4×3, then the order of matrix B is _____ .

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11. If $A = \begin{bmatrix} 3 & 24 \\ -4 & 8 \end{bmatrix}$, then check whether it is symmetric matrix or not.

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12. $\begin{bmatrix} 0 & -3 \\ 3 & 0 \end{bmatrix}$ is a _____ matrix.

A. symmetric

B. skew symmetric

C. diagonal

D. unit

Answer: B

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13. The product of $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and $\begin{bmatrix} 3 & 4 \end{bmatrix}$ is _____ .

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14. The product of $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $\begin{bmatrix} x \\ y \end{bmatrix}$ is _____ .

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15. The product of $\begin{bmatrix} 2 & -4 & 4 \end{bmatrix}$, and $\begin{bmatrix} 1 \\ 3 \\ 5 \end{bmatrix}$ is _____ .

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16. If all the diagonal elements in a diagonal matrix is 0, then it is a _____ matrix.

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17. If $\begin{bmatrix} 2 & -1 & 0 \\ 9 & 2 & 4 \\ 6 & 3 & -9 \end{bmatrix}$, find (k+l) A.

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18. If $A = \begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix}, B = \begin{bmatrix} 9 & 5 \\ -6 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & -6 \\ -3 & 1 \end{bmatrix}$ then find (A+B)+C.

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19. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$, then find 3A+7B.

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20. If $5\begin{bmatrix} -3 & 1 \\ x & 2 \end{bmatrix} + \begin{bmatrix} y & 4 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} -15 & 9 \\ 6 & z \end{bmatrix}$, then find x,y,z.

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21. If $A = \begin{bmatrix} 2 & -3 \\ 5 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 20 & 31 \\ 44 & 53 \end{bmatrix}$, then find the matrix X such that A+X=B.

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22. If $A = \begin{bmatrix} 11 & -13 \\ -13 & 11 \end{bmatrix}$, then find A^T = ?

A. $\begin{bmatrix} 11 & -13 \\ -13 & 11 \end{bmatrix}$

B. $\begin{bmatrix} 11 & 13 \\ -13 & 11 \end{bmatrix}$

C. $\begin{bmatrix} 11 & -13 \\ 13 & 11 \end{bmatrix}$

D. $\begin{bmatrix} -11 & -13 \\ -13 & -11 \end{bmatrix}$

Answer: A

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23. If $A = [a_{ij}]_{2\times 3}$, difined as $a_{ij} = i^2 - j + 1$, then find matrix A.

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24. If $A = \begin{bmatrix} 5 & 3 & 1 \\ 2 & 9 & -11 \end{bmatrix}, B = \begin{bmatrix} 22 & 31 & 43 \\ 16 & 11 & 44 \end{bmatrix}$ and $C = \begin{bmatrix} 51 & 33 & 2 \\ 41 & 5 & -14 \end{bmatrix}$, then find 4C-2B-A.

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25. Compute :

$$2\begin{bmatrix} 2 & 3 & 4 & 1 \\ -5 & 11 & 6 & 7 \end{bmatrix} + 5\begin{bmatrix} 11 & 13 & -3 & 4 \\ 5 & -3 & 4 & -7 \end{bmatrix} - 6\begin{bmatrix} 6 & 12 & 4 & -2 \\ -3 & 5 & 11 & 7 \end{bmatrix}$$

.

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26. Find a,p,q and b if

$$A = \begin{bmatrix} a-3 & 6 & b-q \\ 1 & 5 & 9 \end{bmatrix} = \begin{bmatrix} 0 & 2p-q & -4 \\ \frac{q-p}{2} & 5 & a+b \end{bmatrix}.$$

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27. If A, B and C are three matrices of order $3 \times 4, 3 \times 2$ and $a \times 2$ respectively, then find the order of matrix $A^T BC^T$.

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28. If X and Y are two matrices such that $X + Y = \begin{bmatrix} 4 & -3 \\ 5 & 2 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 6 & -5 \\ 3 & 2 \end{bmatrix}$, then find the matrices X and Y.

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Short Answer Type Questions

1. If $A\begin{bmatrix}1 & 2 & 3 & 5 & 6\\ 4 & -1 & 2 & -3 & 1\end{bmatrix}$ and $B=\begin{bmatrix}5 & 3\\ 2 & 1\\ -3 & 5\\ 4 & 1\\ 1 & 2\end{bmatrix}$, then find AB and BA.

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2. If $A-B^T\begin{bmatrix}2 & 3 & 4 & -1\\ 0 & 3 & -1 & 5\end{bmatrix}$ and $A^T+B=\begin{bmatrix}5 & 3\\ 1 & 0\\ 2 & 5\\ 3 & -1\end{bmatrix}$, then find the matrices A and B.

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3. If $A = \begin{bmatrix} 3 & 3 \\ 3 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$, then find AB and BA. What do you observe ?

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4. If $A = \begin{bmatrix} 2 & 3 & 5 & 6 \\ -1 & 2 & -3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -5 & 3 & 7 \\ 8 & -3 & -1 & 2 \end{bmatrix}$, then find $A^T + B^T$ and $(A + B)^T$. What do you notice ?

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5. If $A = \begin{bmatrix} -1 & 3 \\ 4 & 5 \end{bmatrix}$, then find (A-I)(A-2I).

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6. If $A = \begin{bmatrix} 1 & 7 \\ 5 & 6 \end{bmatrix}, B = \begin{bmatrix} -3 & 2 \\ -1 & 5 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & -3 \\ 4 & 1 \end{bmatrix}$, then find A(B+C) and AB+AC.

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7. Given $A = \begin{bmatrix} 2 & -3 \\ 4 & 5 \end{bmatrix}, B = \begin{bmatrix} 7 & 9 \\ 8 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} -2 & 3 \\ 1 & -5 \end{bmatrix}$, find (AB)C and A(BC). What do you notice ?

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8. If $\begin{bmatrix} 1 & -1 & 2 \\ 3 & a & 1 \end{bmatrix} \begin{bmatrix} -1 \\ 3 \\ 2 \end{bmatrix} = \begin{bmatrix} b \\ 14 \end{bmatrix}$, then find (a+b).

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9. If $P = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $Q = \begin{bmatrix} w & x \\ y & z \end{bmatrix}$, then show that $(PQ)^T = Q^T P^T$.

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Essay Type Questions

1. If $P = \begin{bmatrix} -1 & 0 \\ 2 & -1 \end{bmatrix}$ and $f(x) = x^2 - 2x + 2$, then find f(P).

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2. If $A = \begin{bmatrix} -10 & 11 \\ 6 & -3 \end{bmatrix} = [-32 \quad 46]$, then find A.

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3. If $A = \begin{bmatrix} -5 & 3 \\ 2 & 1 \\ 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 14 & -13 \\ 1 & 3 \\ 14 & -3 \end{bmatrix}$, then find the matrix X such that AX = B.

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4. If $P = \begin{bmatrix} 2005 & 2004 \\ 2004 & 2005 \end{bmatrix}$, then find X such that PX=XP=P.

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5. If $x = \begin{pmatrix} 2 & -1 \\ 3 & 0 \end{pmatrix}$ and $g(x) = x^2 + x - 2$, find g(x).

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Concept Application Level 1

1. If $\begin{pmatrix} -2 & -1 \\ 3a & b \\ 4 & -6+x \end{pmatrix} = \begin{pmatrix} -2 & -1 \\ 9 & -1 \\ 4 & 2 \end{pmatrix}$, then $\frac{x}{a+b}$ =

A. $\frac{1}{4}$

B. $\frac{-1}{11}$

C. -11

D. 4

Answer: D

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2. If $A\begin{pmatrix} -5 & 7 \\ 3 & -8 \end{pmatrix}$ and $B = \begin{pmatrix} -12 & 24 \\ -36 & 52 \end{pmatrix}$, then find matrix X such that A+X = B

A. $\begin{pmatrix} -7 & 17 \\ 36 & -60 \end{pmatrix}$

B. $\begin{pmatrix} -7 & 17 \\ -36 & 60 \end{pmatrix}$

C. $\begin{pmatrix} -7 & 17 \\ 36 & 60 \end{pmatrix}$

D. $\begin{pmatrix} -7 & -17 \\ 36 & 60 \end{pmatrix}$

Answer: B

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3. If $A = \begin{pmatrix} a-a & b-b \end{pmatrix}$ then $\left(\frac{1}{ab}\right)A =$

A. $\left(\frac{1}{b} + \frac{1}{b}\frac{1}{a} - \frac{1}{a}\right)$

B. $\left(\frac{1}{a} - \frac{1}{a}\frac{1}{b} - \frac{1}{b}\right)$

C. $\left(\frac{1}{b} - \frac{1}{b}\frac{1}{a} - \frac{1}{a}\right)$

D. $\begin{pmatrix} a^2b & -a^2b & b^2a & -b^2a \end{pmatrix}$

Answer: C

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4. If the matrix $\begin{bmatrix} a & a+b \\ a+b+c & a+b+c+d \end{bmatrix}$ is symmetric, then which of the following holds ?

A. a=0

B. b=0

C. c=0

D. d=0

Answer: C

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5. If $A = \begin{bmatrix} 4 & -2 \\ 3 & -1 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -7 & 2 \\ 5 & 9 \\ 3 & 4 \end{bmatrix}$, then 2A+7B=

A. $\begin{bmatrix} 41 & 10 \\ 40 & 60 \\ 26 & 38 \end{bmatrix}$

B. $\begin{bmatrix} -41 & 10 \\ 41 & 61 \\ 26 & 38 \end{bmatrix}$

C. $\begin{bmatrix} 14 & 5 \\ 30 & -60 \\ 24 & 26 \end{bmatrix}$

D. $\begin{bmatrix} -41 & 10 \\ 41 & 61 \\ 25 & 38 \end{bmatrix}$

Answer: D

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6. If $A = \begin{pmatrix} 1 & -3 & 4 \\ 2 & 1 & -2 \end{pmatrix}, B = \begin{pmatrix} -2 & -4 & 5 \\ 1 & -1 & 3 \end{pmatrix}$ and 5A-3B+2X=O, then X=

A. $\begin{pmatrix} -11 & 3 & -5 \\ -7 & -8 & 19 \end{pmatrix}$

B. $\frac{1}{2}\begin{pmatrix} -11 & 3 & -5 \\ -7 & -8 & 19 \end{pmatrix}$

C. $\frac{1}{2}\begin{pmatrix} 11 & -3 & 5 \\ 7 & 8 & -19 \end{pmatrix}$

D. None of these

Answer: B

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7. If the matrix $\begin{bmatrix} a+b & 0 & 0 \\ 0 & b+c & 0 \\ 0 & 0 & c+a \end{bmatrix}$, (where a,b,c are positive integers) is a scalar matrix, then the value of (a+b+c) can be

A. 6

B. 8

C. 5

D. 7

Answer: A

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8. If $A\begin{bmatrix}1 & 4 & -3\\5 & 7 & 9\end{bmatrix}$ and $B=\begin{bmatrix}5 & -7\\4 & 5\end{bmatrix}$, then

A. AB exists.

B. BA exists.

C. (A+B) exists.

D. (A-B) exists.

Answer: B

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9. If $\begin{bmatrix}0 & 3 & -5\\-3 & 0 & 6\\5 & -6 & 0\end{bmatrix}$ is a

A. scalar matrix.

B. symmetric matrix.

C. skew symmetric.

D. diagonal matrix.

Answer: C

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10. If $A = \begin{bmatrix} 2 & 4 \\ -3 & 7 \end{bmatrix}$ and $B = A^T$, then $A^T + B^T$ is

A. $\begin{bmatrix} 4 & 1 \\ 1 & 14 \end{bmatrix}$

B. $\begin{bmatrix} 4 & 8 \\ 7 & 7 \end{bmatrix}$

C. $\begin{bmatrix} 4 & -6 \\ 8 & 14 \end{bmatrix}$

D. None of these

Answer: A

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11. If A and B are commute then $(A+B)^2$ =

A. A^2+B^2

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

C. A^2-B^2

D. $A^2-2AB+B^2$

Answer: B

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12. If $A=\begin{bmatrix}2 & -3 & 1\end{bmatrix}$ and $B=\begin{bmatrix}4\\2\\-2\end{bmatrix}$, then find $2A^T+B$

A. $\begin{bmatrix}4\\8\\5\end{bmatrix}$

B. $\begin{bmatrix}8\\-4\\0\end{bmatrix}$

C. $\begin{bmatrix} 8 \\ 4 \\ 0 \end{bmatrix}$

D. $\begin{bmatrix} 8 \\ -8 \\ 0 \end{bmatrix}$

Answer: B

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13. If $\begin{bmatrix} p \\ q \\ r \end{bmatrix}$ and $B = [3 \quad 4 \quad 5]$, then AB is

A. $\begin{bmatrix} 3p & 4p & 5p \\ 3q & 4q & 5q \\ 3p & 4q & 5r \end{bmatrix}$

B. $\begin{bmatrix} 3p & 3q & 3p \\ 4p & 4q & 4q \\ 5q & 5p & 5r \end{bmatrix}$

C. $\begin{bmatrix} 3p & 4p & 5p \\ 3q & 4q & 5q \\ 3r & 4r & 5r \end{bmatrix}$

D. None of these

Answer: C

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14. If the orders of matrices A^T, B and C^T are $3 \times 4, 2 \times 3$ and 1×2 respectively, then the order of the matrix $\left(AB^T\right)C$ is

A. 3×2

B. 2×3

C. 4×2

D. 4×1

Answer: D

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15. A is a 2×2 matrix, such that $A = [(a_{ij})]$, where $a_{ij} = 2i - j + 1$. The matrix A is

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

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

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

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

Answer: A

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16. If $A + B = \begin{bmatrix} 01 & -11 \\ 9 & 7 \end{bmatrix}$ and $A - B = \begin{bmatrix} -8 & 9 \\ 9 & -5 \end{bmatrix}$, then B=

A. $\begin{bmatrix} 9 & -10 \\ 0 & -6 \end{bmatrix}$

B. $\begin{bmatrix} 9 & 10 \\ 0 & -6 \end{bmatrix}$

C. $\begin{bmatrix} \frac{9}{2} & -10 \\ 0 & 6 \end{bmatrix}$

D. $\begin{bmatrix} 9 & 10 \\ 0 & 6 \end{bmatrix}$

Answer: C

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17. If $A = \begin{pmatrix} -2 & -1 \\ -5 & -3 \end{pmatrix} B = \begin{pmatrix} -3 & 1 \\ 5 & -2 \end{pmatrix}$ and $(AB)^n = I$ then n is (a/an)

A. odd number.

B. even number

C. $\forall n \in N.$

D. None of these

Answer: C

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18. If $A = \begin{pmatrix} 4 & 3 \\ -5 & 2 \end{pmatrix}$, then $A^2 - 6A =$

A. 23I

B. 24I

C. $-23I$

D. $24I$

Answer: C

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19. If $A = \begin{pmatrix} 1 & 5 \\ 3 & 6 \end{pmatrix}$ and $= \begin{pmatrix} 34 \\ 39 \end{pmatrix}$, then find the matrix X such that AX=B.

A. $\begin{pmatrix} 0 \\ 7 \end{pmatrix}$

B. $\begin{pmatrix} 7 \\ -1 \end{pmatrix}$

C. $\begin{pmatrix} -1 \\ 7 \end{pmatrix}$

D. $\begin{pmatrix} 9 \\ -1 \end{pmatrix}$

Answer: C

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20. If $\begin{pmatrix} 2 & 3 \\ p & 1 \end{pmatrix}\begin{pmatrix} 5 & 2 \\ -4 & 6 \end{pmatrix} = \begin{pmatrix} -2 & q \\ 16 & r \end{pmatrix}$, then 2p+r=

A. q

B. 21

C. 2q

D. q-r

Answer: A

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21. If $A = \begin{pmatrix} 2 & -2 \\ -2 & 2 \end{pmatrix}, B = \begin{pmatrix} 5 & 3 \\ -7 & 2 \end{pmatrix}$ and $= C = \begin{pmatrix} 4 & 2 \\ -8 & 1 \end{pmatrix}$ then

A. AB=BC

B. AB=AC

C. BC=AC

D. None of these

Answer: B

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22. $A = \begin{bmatrix} -5 & -3 & 4 \\ 3 & 2 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 5 & -2 \\ 3 & 1 & 5 \end{bmatrix}$, then find X such that 3A-2B+X=0.

A. $\begin{bmatrix} 7 & 19 & 16 \\ 3 & 4 & 22 \end{bmatrix}$

B. $\begin{bmatrix} -7 & -19 & 16 \\ 3 & 4 & 22 \end{bmatrix}$

C. $\begin{bmatrix} 7 & 19 & -16 \\ -3 & -4 & 22 \end{bmatrix}$

D. $\begin{bmatrix} 7 & 19 & 16 \\ -3 & -4 & 22 \end{bmatrix}$

Answer: C

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23. If $A + B = \begin{bmatrix} 7 & 6 \\ -3 & 2 \end{bmatrix}$ and $A - B = \begin{bmatrix} 1 & 2 \\ 3 & 6 \end{bmatrix}$, then find A.

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

B. $\begin{bmatrix} 8 & 8 \\ 0 & 8 \end{bmatrix}$

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

D. $\begin{bmatrix} -8 & -8 \\ 0 & -8 \end{bmatrix}$

Answer: A

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24. If $B - A^T = \begin{bmatrix} 3 & 4 & -2 \\ 5 & -3 & 7 \end{bmatrix}$ and $B^T + A = \begin{bmatrix} 2 & 0 \\ 5 & -1 \\ 3 & 4 \end{bmatrix}$, then find Matrix A.

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

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

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

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

Answer: C

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25. If $2A-3B=\begin{pmatrix}-27 & 4 & 5\\ 7 & 6 & -15\end{pmatrix}$ and $5A-2B=\begin{pmatrix}-40 & -1 & 18\\ 12 & 15 & -21\end{pmatrix}$, then B=

A. $\begin{pmatrix}55 & -22 & -11\\ -11 & 0 & 33\end{pmatrix}$

B. $\begin{pmatrix}5 & -2 & -1\\ -1 & 0 & 3\end{pmatrix}$

C. $\begin{pmatrix}-55 & 22 & 11\\ 11 & 0 & -33\end{pmatrix}$

D. $\begin{pmatrix}-5 & -2 & 1\\ 1 & 0 & 3\end{pmatrix}$

Answer: B

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26. If $A=\begin{bmatrix}-1 & 2\\ 3 & 4\end{bmatrix}$ and $B=A^T$, then $A^T+B^T=$

A. $\begin{bmatrix}-3 & 4\\ 6 & 8\end{bmatrix}$

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

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

D. $\begin{bmatrix} -2 & 5 \\ 5 & 8 \end{bmatrix}$

Answer: D

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27. $A_x = \begin{bmatrix} 0 & 0 & x \\ 0 & 0 & 0 \end{bmatrix}$ then find the maximum number of possibilities of matrix B_x, in which x can be placed in $a_{11}, a_{21},$ or a_{31}, position such $A_x B_x = O_{2\times 1}$.

A. 1

B. 2

C. 3

D. Cannot be determined

Answer: C

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28. If $A - 2B = \begin{bmatrix} 3 & 6 \\ 7 & 6 \end{bmatrix}$ and $A - 3B = \begin{bmatrix} 2 & 6 \\ 7 & 5 \end{bmatrix}$, then the matrix A is

A. $\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

B. $\begin{bmatrix} 5 & 8 \\ 7 & 6 \end{bmatrix}$

C. $\begin{bmatrix} 6 & 5 \\ 7 & 8 \end{bmatrix}$

D. $\begin{bmatrix} 5 & 8 \\ 2 & 6 \end{bmatrix}$

Answer: A

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29. Which of the following matrices satisfies the equation $A^2 + A = O$?

A. $A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

B. $A = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$

C. $A = \begin{pmatrix} -1 & -1 \\ -1 & -1 \end{pmatrix}$

D. $A = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$

Answer: B

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30. If $A = \begin{bmatrix} 3 & 2 & 7 \\ 1 & 1 & 4 \\ -1 & -1 & 0 \end{bmatrix}, B = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 0 \\ 0 & -1 & -3 \end{bmatrix}$ and $C \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$,

then find 2A+3B-7C.

A. $\begin{bmatrix} 2 & 4 & 23 \\ 8 & 0 & 8 \\ -2 & -5 & 16 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 4 & 23 \\ 8 & -2 & 8 \\ -2 & -5 & -16 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 4 & 23 \\ 8 & -2 & -8 \\ -2 & 5 & -16 \end{bmatrix}$

D. $\begin{bmatrix} 2 & 4 & 2-3 \\ 8 & -2 & 8 \\ -2 & -5 & 16 \end{bmatrix}$

Answer: D

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Level 2

1. If $A = \begin{bmatrix} 2 & -3 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 2 \\ 7 & -1 \end{bmatrix}$, find matrix C such that $C = AB + A^2B$.

A. $\begin{bmatrix} -96 & 21 \\ 36 & 7 \end{bmatrix}$

B. $\begin{bmatrix} 96 & 21 \\ 36 & -7 \end{bmatrix}$

C. $\begin{bmatrix} -96 & -21 \\ 36 & -7 \end{bmatrix}$

D. $\begin{bmatrix} -96 & 21 \\ 36 & -7 \end{bmatrix}$

Answer: D

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2. If $A = \begin{pmatrix} 3 & 1 \\ -4 & 5 \end{pmatrix}, B = \begin{pmatrix} -3 & 1 \\ 4 & -5 \end{pmatrix}$ and $C = \begin{pmatrix} 2 & 1 \\ -1 & 3 \end{pmatrix}$, then

A. AB=AC

B. AC=BC

C. BC=CB

D. A(B+C)=AB+AC

Answer: D

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

A. $\begin{bmatrix} -3 & -4 \\ -1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} -3 & -4 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} -3 & -4 \\ 0 & 1 \end{bmatrix}$

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

Answer: B

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4. If $X = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$ and $X^2 - 3X =$

A. I

B. 3I

C. 4I

D. $-4I$

Answer: C

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5. If $A = \begin{bmatrix} -3 & -2 \\ -1 & 3 \end{bmatrix}$, then $A^2 - 11I$=

A. A

B. I

C. A^2

D. O

Answer: D

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6. If $A = \begin{bmatrix} a-3 & -5 \\ c+1 & b-2 \end{bmatrix}$ is a skew =-symmetric matrix, then a+b-c = _____ .

A. 2

B. 1

C. -1

D. 0

Answer: B

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7. If $A = \begin{bmatrix} 0 & y \\ y & 0 \end{bmatrix}$ which of the following is true ?

A. $A^3 = \begin{bmatrix} 0 & y^3 \\ y^3 & 0 \end{bmatrix}$

B. $A^4 = \begin{bmatrix} y^4 & 0 \\ 0 & y^4 \end{bmatrix}$

C. Both (a) and (b)

D. Neither (a) nor (b)

Answer: C

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8. If $\begin{bmatrix} 4 & -5 \\ 3 & 6 \end{bmatrix} + 2X = \begin{bmatrix} 8 & -1 \\ -7 & 2 \end{bmatrix}$, then X^T =

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

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

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

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

Answer: B

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9. If $A = \begin{bmatrix} p & 2 \\ -4 & -5 \end{bmatrix}, B = \begin{bmatrix} q & r-s \\ r & -5 \end{bmatrix}$ and A=B. Find $\begin{bmatrix} p & q \\ r & s \end{bmatrix}$, if the trace of A+B=-2.

A. $\begin{bmatrix} 2 & 6 \\ -4 & -7 \end{bmatrix}$

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

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

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

Answer: B

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10. If $\begin{bmatrix} 3 & 7 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ -2 & x \end{bmatrix} \begin{bmatrix} -1 \\ 2 \end{bmatrix} = [13]$, then the value of x is

A. 0

B. -1

C. 1

D. 2

Answer: C

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11. If $A = \begin{bmatrix} 0 & x \\ 1 & 0 \end{bmatrix}$, such that $A^2 = 4I$, then x is

A. 4

B. 3

C. 2

D. 1

Answer: A

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12. If $A = \frac{1}{\sqrt{3}}\begin{bmatrix} -8 & 3 \\ 3 & 8 \end{bmatrix}$, then $A^5 =$

A. I

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

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

D. scalar multiple of A

Answer: D

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13. Which of the following is square root of $\begin{bmatrix} 16 & 4 \\ 3 & 13 \end{bmatrix}$?

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

B. $\begin{bmatrix} 16 & 4 \\ 3 & -1 \end{bmatrix}$

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

D. $\begin{bmatrix} 16 & -4 \\ 3 & -11 \end{bmatrix}$

Answer: A

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14. If $5A - 2B = \begin{bmatrix} 11 & 2 & -5 \\ 4 & -3 & 6 \end{bmatrix}$ and $-2A + B = \begin{bmatrix} 4 & -2 & 4 \\ -5 & 3 & 1 \end{bmatrix}$, then A =

A. $\begin{bmatrix} -19 & 2 & 3 \\ -6 & 3 & 8 \end{bmatrix}$

B. $\begin{bmatrix} 19 & -2 & 3 \\ -6 & 3 & 8 \end{bmatrix}$

C. $\begin{bmatrix} 19 & 2 & 3 \\ 6 & 3 & 8 \end{bmatrix}$

D. None of these

Answer: B

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15. If $\begin{bmatrix} 4 & 5 \end{bmatrix} \begin{bmatrix} 1 & 6 \\ x & 3 \end{bmatrix} \begin{bmatrix} -2 \\ 3 \end{bmatrix} = [9]$, then the value of x is

A. 9

B. -9

C. 10

D. -10

Answer: C

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16. If $A = \begin{bmatrix} 5 & -6 \\ 2 & 4 \end{bmatrix}$ and $B = A^T$, then $A^T - B^T$ is _____ .

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

B. $\begin{bmatrix} 0 & 8 \\ -8 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 0 & -8 \\ 8 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$

Answer: B

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17. If $A = \begin{bmatrix} 8 \\ -1 \\ -7 \end{bmatrix}$ and $B = [2 \quad 5 \quad -6]$, then find $3A + B^T$.

A. $\begin{bmatrix} 26 \\ 2 \\ -27 \end{bmatrix}$

B. $\begin{bmatrix} 36 \\ 4 \\ -1 \end{bmatrix}$

C. $\begin{bmatrix} 18 \\ 2 \\ -9 \end{bmatrix}$

D. $\begin{bmatrix} 2 \\ 26 \\ -27 \end{bmatrix}$

Answer: A

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18. If $A = \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$, then find $A^n (n \in N)$ _____ .

A. $\begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$

B. $\begin{bmatrix} 7^n & 0 \\ 0 & 7^n \end{bmatrix}$

C. $\begin{bmatrix} 7 & 7^n \\ 0 & 7^n \end{bmatrix}$

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

Answer: B

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19. If $A = \begin{bmatrix} p & 0 \\ 0 & p \end{bmatrix}$ then A^{n+1} is _____ .

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

B. $\begin{bmatrix} p^{n+1} & 0 \\ 0 & p^{n+1} \end{bmatrix}$

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

D. None of these

Answer: B

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20. If $A = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$, then $\frac{A + A^T}{2}$ is _____ .

A. symmetric

B. skew symmetric

C. diagonal

D. unit matrix

Answer: A

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Level 3

1. If $A = \begin{bmatrix} p & -1 \\ q & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & -1 \\ 1 & 2 \end{bmatrix}$ and $(A+B)^2 = A^2 + 2AB + B^2$, then p-q= _____ .

A. 2

B. -1

C. 3

D. 1

Answer: B

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2. If $P = \begin{bmatrix} 2 & -1 \\ -1 & 3 \end{bmatrix}, Q = \begin{bmatrix} 1 & -2 \\ -3 & 0 \end{bmatrix}$ and $R = \begin{bmatrix} -2 & 1 \\ 2 & -1 \end{bmatrix}$. then find PQ+PR.

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

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

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

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

Answer: D

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3. If $\begin{pmatrix} a & 3 \\ 4 & 5 \end{pmatrix}\begin{pmatrix} 3 & -2 \\ b & 8 \end{pmatrix} = \begin{pmatrix} 30 & 20 \\ 52 & a \end{pmatrix}$, then find 2a+b-c.

A. 16

B. 15

C. 12

D. -20

Answer: D

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4. If $P = [2 \quad 2 \quad 1], Q = [1 \quad 2 \quad 3], R = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $S = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$,

then PR+QS=

A. [19]

B. [10]

C. [15]

D. [12]

Answer: A

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5. If $y = \begin{pmatrix} 4 & -2 \\ 3 & 0 \end{pmatrix}$ and $f(y) = y^2 - y - 6$, find f(y).

A. $\begin{pmatrix} 0 & 6 \\ 9 & 12 \end{pmatrix}$

B. $\begin{pmatrix} 0 & 6 \\ 9 & -12 \end{pmatrix}$

C. $\begin{pmatrix} 0 & -6 \\ 9 & -12 \end{pmatrix}$

D. $\begin{pmatrix} 0 & 6 \\ 9 & -12 \end{pmatrix}$

Answer: C

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6. If the matrix $A = \begin{bmatrix} 5 & -3 \\ 5 & -3 \end{bmatrix}$, then A^{n+1} = _____ .

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

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

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

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

Answer: C

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7. If $A(x) = \begin{bmatrix} e^x & e^x \\ e^{-x} & e^{-x} \end{bmatrix}$ then A(x) A(y)=

A. A(x+y)A(x-y)

B. A(x+y)+A(x-y)

C. A(x+y)-A(x-y)

D. A(x+y)

Answer: B

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8. If $A = \begin{bmatrix} 6 & -7 & 1 \\ 3 & -2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 1 & 2 \\ -4 & 3 & -5 \end{bmatrix}$ then find X such that 2A-B+X=O.

A. $\begin{bmatrix} 7 & 6 & 0 \\ 1 & 3 & -5 \end{bmatrix}$

B. $\begin{bmatrix} 10 & 1 & 2 \\ 3 & 2 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 7 & 7 & 0 \\ 10 & 3 & 5 \end{bmatrix}$

D. $\begin{bmatrix} -7 & 15 & 0 \\ -10 & 7 & -7 \end{bmatrix}$

Answer: D

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9. If $\begin{bmatrix} 2 & 4 \\ p & 1 \end{bmatrix}\begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 10 & q \\ -2 & r \end{bmatrix}$, then pq= _____ .

A. 4(r-1)

B. 5r

C. 4r+2

D. r

Answer: A

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10. If $A = \begin{bmatrix} -13 & 24 \\ -7 & 13 \end{bmatrix}$, then A^8 = _____ .

A. A

B. I

C. O

D. None of these

Answer: B

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11. If $A+B=\begin{bmatrix}8 & -9\\ 3 & 5\end{bmatrix}$ and $A-B=\begin{bmatrix}6 & 5\\ 1 & 7\end{bmatrix}$, the A= _____ .

A. $\begin{bmatrix}7 & -2\\ 2 & 6\end{bmatrix}$

B. $\begin{bmatrix}7 & -2\\ -2 & 6\end{bmatrix}$

C. $\begin{bmatrix}-7 & 2\\ 2 & 6\end{bmatrix}$

D. $\begin{bmatrix}-7 & -2\\ -2 & -6\end{bmatrix}$

Answer: A

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12. If $A = \begin{bmatrix} 7 & 9 \\ 3 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} 13 \\ 18 \end{bmatrix}$ then find the matrix X such that AX=B.

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

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

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

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

Answer: C

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13. If $A = \begin{bmatrix} a & b \\ 2 & -1 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 \\ 4 & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$, then (b,a) = _____ .

A. (1,-1)

B. (-1,1)

C. (1,1)

D. (-1,0)

Answer: B

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14. If $A = \begin{bmatrix} 6 & x \\ 7 & -6 \end{bmatrix}$ and $A^2 = I$, then x= _____ .

A. 5

B. $\frac{-5}{2}$

C. -5

D. 1

Answer: C

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15. If $A - B = \begin{bmatrix} 18 & 1 & -9 \\ 11 & 12 & 2 \end{bmatrix}$ and $A + 3B = \begin{bmatrix} 26 & 1 & 3 \\ -13 & -16 & 10 \end{bmatrix}$, then find A.

A. $\begin{bmatrix} 20 & 1 & 6 \\ 5 & 5 & 4 \end{bmatrix}$

B. $\begin{bmatrix} 20 & 1 & 6 \\ -5 & -5 & 4 \end{bmatrix}$

C. $\begin{bmatrix} 20 & 1 & -6 \\ 5 & 5 & 4 \end{bmatrix}$

D. $\begin{bmatrix} 20 & 1 & -6 \\ -5 & -5 & -4 \end{bmatrix}$

Answer: C

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16. If $A = \begin{bmatrix} 1 & 4 \\ -2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -6 & -1 \\ -8 & 2 \end{bmatrix}$, then AB + BA = _____

.

A. $\begin{bmatrix} -42 & 22 \\ 40 & 10 \end{bmatrix}$

B. $\begin{bmatrix} -42 & -22 \\ -40 & -10 \end{bmatrix}$

C. $\begin{bmatrix} -42 & 22 \\ -40 & 10 \end{bmatrix}$

D. $\begin{bmatrix} 42 & 22 \\ 40 & 10 \end{bmatrix}$

Answer: B

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17. If $A = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$ and $f(x) = x^2 - 4x + 3$, then find f(A).

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

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

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

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

Answer: A

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18. If $[5 \quad 6]\begin{bmatrix} 1 & -3 \\ -1 & x \end{bmatrix}\begin{bmatrix} 3 \\ 4 \end{bmatrix} = [-15]$, then the value of x is _____ .

A. 4

B. 2

C. 3

D. 1

Answer: B

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19. If $A = \begin{bmatrix} 1 & -4 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & -1 \\ 3 & 2 \end{bmatrix}$, then find the matrix C such that $C = AB + B^2$.

A. $\begin{bmatrix} 37 & 25 \\ 16 & 9 \end{bmatrix}$

B. $\begin{bmatrix} 27 & -17 \\ 48 & 2 \end{bmatrix}$

C. $\begin{bmatrix} 4 & 5 \\ 17 & 16 \end{bmatrix}$

D. $\begin{bmatrix} 3 & -15 \\ 6 & 18 \end{bmatrix}$

Answer: B

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20. If $A - B^T = \begin{bmatrix} -2 & 2 & 1 \\ 3 & 6 & 5 \end{bmatrix}$ and $A^T + B = \begin{bmatrix} -4 & 5 \\ 8 & -2 \\ 9 & 1 \end{bmatrix}$, then matrix A = _____ .

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

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

C. $\begin{bmatrix} 9 & 5 & 7 \\ 3 & 2 & 1 \end{bmatrix}$

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

Answer: D

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