Twelfth Grade - Matrices and Determinants

1) Which one of the following is 4 × 1 matrices?

$$a)\begin{pmatrix}3&4&5&2\end{pmatrix}\ b)\begin{bmatrix}3\\4\\5\\2\end{bmatrix}\ c)\begin{pmatrix}3&4&5&2\\3&3&3&2\end{pmatrix}\ d)\text{None of these}$$

- b
- a
- c
- d

2) Find x, y, z, w.

$$\text{If}\begin{pmatrix}x-y & 2x+z\\ 2x-y & 3z+w\end{pmatrix}=\begin{pmatrix}-1 & 5\\ 0 & 13\end{pmatrix}$$

- (1, 2, 3, 4)
- (-1, -2, -3, -4)
- (3, 4, 3, 2)
- (1, -2, 3, -4)

3) Find x and y.

$$\text{If } x+y=\begin{pmatrix}7&0\\2&5\end{pmatrix}\text{ and } x-y=\begin{pmatrix}3&0\\0&3\end{pmatrix}$$

$$a)\begin{pmatrix}5&0\\1&4\end{pmatrix}\begin{pmatrix}2&0\\1&1\end{pmatrix}\ b)\begin{pmatrix}-5&0\\1&4\end{pmatrix}\begin{pmatrix}2&0\\-1&1\end{pmatrix}\ c)\begin{pmatrix}-5&0\\-1&4\end{pmatrix}\begin{pmatrix}2&0\\-1&1\end{pmatrix}\ d)\begin{pmatrix}-5&0\\-1&-4\end{pmatrix}\begin{pmatrix}-2&0\\1&1\end{pmatrix}$$

- b
- c

- d
- a

4) Find a matrix x such that

$$2A + B + X = 0 \quad A = \begin{pmatrix} -1 & 2 \\ 3 & 4 \end{pmatrix} \text{and } B = \begin{pmatrix} 3 & -2 \\ 1 & 5 \end{pmatrix}$$

$$a) \begin{pmatrix} 1 & 2 \\ 7 & 13 \end{pmatrix} b) \begin{pmatrix} -1 & 2 \\ 7 & 13 \end{pmatrix} c) \begin{pmatrix} 1 & 2 \\ 7 & -13 \end{pmatrix} d) \begin{pmatrix} -1 & -2 \\ -7 & -13 \end{pmatrix}$$

- d
- a
- c
- b

5) If A = diag (2, -5, 9) B = diag (1, 1, -4) C = diag (-6, 3, 4), find A - 2B.

- diag (0, -7, 17)
- diag (8, -2, 5)
- diag (-9, 14, -8)
- diag (15, -7, 17)

6) Find the value of x, y, z [xy + 2z - 3] + [y 4 5] = [4 9 12]

$$\begin{bmatrix} xy+2 & z-3 \end{bmatrix} + \begin{bmatrix} y & 4 & 5 \end{bmatrix} = \begin{bmatrix} 4 & 9 & 12 \end{bmatrix}$$

- (1, 3, -10)
- (1, 3, 10)
- (-1, -3 , -10)
- (1, -3, 10)

7) Find AB.

$$\text{If } A=\begin{pmatrix}1 & -2 & 3\\ 3 & 2 & -1\end{pmatrix} \text{ and } B=\begin{pmatrix}2 & 3\\ -1 & 2\\ 4 & -5\end{pmatrix}$$

$$a)\begin{pmatrix}16 & -16\\ 0 & 18\end{pmatrix}\ b)\begin{pmatrix}16 & -16\\ 0 & -18\end{pmatrix}\ c)\begin{pmatrix}16 & 16\\ 0 & 18\end{pmatrix}\ d)\begin{pmatrix}-16 & -16\\ 0 & -18\end{pmatrix}$$

- a
- c
- b
- d

8) Find the values x, if $A^2 = B$.

$$A=\begin{pmatrix}x & 0\\ 1 & 1\end{pmatrix} B=\begin{pmatrix}1 & 0\\ 5 & 1\end{pmatrix}$$

- (±3, 4)
- (±1, -4)
- (±1, 4)
- (±2, 4)

9) Find Transpose of A.

$$A^T, \text{ If } A=\begin{pmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{pmatrix}$$

$$a)\begin{pmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{pmatrix}\ b)\begin{pmatrix}\cos\theta & -\sin\theta\\ -\sin\theta & \cos\theta\end{pmatrix}\ c)\begin{pmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{pmatrix}\ d)\begin{pmatrix}-\cos\theta & -\sin\theta\\ -\sin\theta & -\cos\theta\end{pmatrix}$$

- d
- b
- c
- a

10) Find the values of a and b.

$$\text{If} \begin{pmatrix} a+b & 2 \\ 5 & ab \end{pmatrix} = \begin{pmatrix} 6 & 2 \\ 5 & 8 \end{pmatrix}$$

- (4, -2)
- (4, 2)
- (-4, 2)
- (-4, -2)

11) For what values of x and y the following matrices are equal.

$$A = \begin{pmatrix} 2x+1 & 3y \\ 0 & y^2-5y \end{pmatrix} \quad B = \begin{pmatrix} x+3 & y^2+2 \\ 0 & -6 \end{pmatrix}$$

- (2, 4)
- (2, 3)
- (2, 2)
- (-2, 2)

12) Find the value of x such that

$$\begin{pmatrix} 1 & x & 1 \end{pmatrix} \begin{pmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ x \end{pmatrix} = 0$$

- (-2, 14)
- (2, 14)
- (-2, -14)
- (2, -14)

13) Find the product of the matrices

$$\begin{bmatrix} \cos^2\theta & \cos\theta\sin\theta \\ \cos\theta\sin\theta & \sin^2\theta \end{bmatrix} \text{ and } \begin{bmatrix} \cos^2\phi & \cos\phi\ \sin\phi \\ \cos\phi\ \sin\phi & \sin^2\phi \end{bmatrix}$$

$$\text{a)}\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \text{b)}\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \text{c)}\begin{bmatrix} -1 & 0 \\ 0 & 0 \end{bmatrix} \text{d)}\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

- a
- d
- b
- c

14) Find a matrix D such that CD - AB = 0

$$A=\begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix} B=\begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix} C=\begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$$

$$\text{a)}\begin{bmatrix} -191 & -110 \\ 77 & 44 \end{bmatrix} \text{b)}\begin{bmatrix} 191 & 110 \\ -77 & -44 \end{bmatrix} \text{c)}\begin{bmatrix} -191 & -110 \\ -77 & -44 \end{bmatrix} \text{d)}\begin{bmatrix} 191 & 110 \\ -77 & 44 \end{bmatrix}$$

- a
- b
- d
- c

15) Find A

$$\text{If} \begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 & -10 \\ 1 & -2 & -5 \\ 9 & 22 & 15 \end{bmatrix}$$

$$a. \begin{bmatrix} 1 & 2 & 5 \\ 3 & 4 & 0 \end{bmatrix} \quad b. \begin{bmatrix} -1 & -2 & -5 \\ -3 & -4 & 0 \end{bmatrix} \quad c. \begin{bmatrix} 1 & -2 & -5 \\ 3 & 4 & 0 \end{bmatrix} \quad d. \begin{bmatrix} -1 & -2 & 5 \\ 3 & 4 & 0 \end{bmatrix}$$

- d
- c
- a
- b

16) There are two families A and B. There are 4 men, 6 women and 2 children in family A and 2 men, 2 women and 4 children in family B. The Recommended daily allowance for calories is, man : 2400, women : 1900, Children : 1800 and for proteins is, man : 55, women : 45 and Child : 33

$$a) \begin{pmatrix} 24000 & 500 \\ 15589 & 234 \end{pmatrix} b) \begin{pmatrix} 23400 & 456 \\ 34216 & 342 \end{pmatrix} c) \begin{pmatrix} 24600 & 556 \\ 15800 & 332 \end{pmatrix} d) \begin{pmatrix} 23450 & 543 \\ 12312 & 332 \end{pmatrix}$$

- b
- a
- d
- c

17) Use matrix multiplication to divide $30, 000 in two parts such that the total annual interest at 9% on the first part and 11% on the second part amounts to $3060

- 12000 and 18000
- 15000 and 15000
- 16000 and 12000
- 6000 and 24000

18) Find x such that $(xI + yA)^2 = A$

$$\text{If } A=\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$$

- 1
- y
- ±y
- -y

19) Find the values of ?

$$\text{If } A=\begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix} \text{ and satisfying the equation } A^T+A=I$$

- ?
- -?
- 2?
- 3?

20) Find AB

$$\text{If } A=\begin{pmatrix} 4 & 9 \\ 6 & 3 \\ 2 & 5 \end{pmatrix} \text{and } B=\begin{pmatrix} 8 & 1 & 3 \\ 4 & 7 & 6 \end{pmatrix}$$

$$\text{a)}\begin{pmatrix} -68 & -67 & -66 \\ -60 & -27 & -36 \\ -36 & -37 & -36 \end{pmatrix} \text{b)}\begin{pmatrix} -68 & 67 & 66 \\ 60 & -27 & 36 \\ 36 & 37 & -36 \end{pmatrix} \text{c)}\begin{pmatrix} -68 & -67 & -66 \\ 60 & 27 & 36 \\ 36 & 37 & 36 \end{pmatrix} \text{d)}\begin{pmatrix} 68 & 67 & 66 \\ 60 & 27 & 36 \\ 36 & 37 & 36 \end{pmatrix}$$

- c
- b
- a
- d

21) Find AB

$$\text{If } A=\begin{pmatrix}0 & 1 & 3\\ 6 & 1 & 7\\ 9 & 3 & 8\\ 5 & 2 & 4\end{pmatrix} \text{and } B=\begin{pmatrix}7 & 4\\ 5 & 8\\ 7 & 6\end{pmatrix}$$

$$\text{a)}\begin{pmatrix}26 & 26\\ 96 & 74\\ 134 & 108\\ 73 & 60\end{pmatrix}\quad \text{b)}\begin{pmatrix}26 & 26\\ -96 & 74\\ 134 & -108\\ 73 & 60\end{pmatrix}\quad \text{c)}\begin{pmatrix}-26 & 26\\ 96 & -74\\ -134 & 108\\ 73 & 60\end{pmatrix}\quad \text{d)}\begin{pmatrix}-26 & 26\\ -96 & 74\\ 134 & -108\\ 73 & 60\end{pmatrix}$$

- c
- b
- a
- d

22) Using the equation system
6x? + 3x? + 1x? = 22
6x? + 4x? - 2x? = 12
4x? - 3x? + 5x? = 10. Find x?, x?, x?

$$\text{a)}\begin{pmatrix}2\\ 3\\ 1\end{pmatrix}\quad \text{b)}\begin{pmatrix}1\\ 2\\ 1\end{pmatrix}\quad \text{c)}\begin{pmatrix}1\\ 2\\ 3\end{pmatrix}\quad \text{d)}\begin{pmatrix}5\\ 4\\ 1\end{pmatrix}$$

- b
- a
- c
- d

23) Find the inverse of

$$A=\begin{pmatrix}6 & 3 & 1\\ 1 & 4 & -2\\ 4 & -1 & 5\end{pmatrix}$$

a) $\begin{pmatrix}0.3462 & -0.3077 & -0.1923\\ -0.2500 & -0.5000 & 0.2500\\ -0.3263 & -0.3462 & 0.4038\end{pmatrix}$ b) $\begin{pmatrix}0.3462 & -0.3077 & -0.1923\\ -0.2500 & -0.5000 & -0.2500\\ -0.3263 & 0.3462 & 0.4038\end{pmatrix}$

c) $\begin{pmatrix}0.3462 & -0.3077 & -0.1923\\ -0.2500 & 0.5000 & 0.2500\\ -0.3263 & 0.3462 & 0.4038\end{pmatrix}$ d) $\begin{pmatrix}-0.3462 & -0.3077 & -0.1923\\ -0.2500 & -0.5000 & 0.2500\\ -0.3263 & 0.3462 & 0.4038\end{pmatrix}$

- b
- d
- c
- a

24) Find SA

$$\text{If } s=2 \text{ and } A=\begin{pmatrix}4 & 8 & 3\\ 2 & 1 & -2\\ 6 & 5 & 7\end{pmatrix}$$

a) $\begin{pmatrix}-8 & -16 & 6\\ 4 & 2 & -4\\ 12 & 10 & 14\end{pmatrix}$ b) $\begin{pmatrix}-8 & 16 & 6\\ 4 & -2 & -4\\ 12 & 10 & -14\end{pmatrix}$ c) $\begin{pmatrix}8 & -16 & 6\\ 4 & -2 & -4\\ 12 & -10 & 14\end{pmatrix}$ d) $\begin{pmatrix}8 & 16 & 6\\ 4 & 2 & -4\\ 12 & 10 & 14\end{pmatrix}$

- d
- c
- a
- b

25) We can say A is

$$\text{If } A = \begin{pmatrix} 10 & 8 \\ 4 & 5 \end{pmatrix}$$

- Non - Singular
- Singular
- Non - Convertible
- None of these

26) We can say A is

$$\text{If } A = \begin{vmatrix} 6 & 1 & 7 \\ 9 & 3 & 8 \\ 5 & 2 & 4 \end{vmatrix}$$

- None of these
- Non - Singular
- Singular
- Non - convertible

27) The determinant of the transpose A? is the same as

- The determinant of A'
- The determinant of A
- None of these
- The transpose A

28) Interchange of any two rows (or any two) columns will

- Not change the algebraic sign of the determinant
- Determinant becomes zero
- Change the algebraic sign of the determinant
- None of these

29) Multiplication of any one row (or one column) by a scalar k will

- Change the value of the determinant k-fold
- Not change the value of the determinant k - fold
- Matrix will diminish
- None of these

30) The addition of a multiple of any row (column) to another row (column) will leave

- The value of the determinant becomes 1
- The value of the determinant changes
- The value of the determinant unchanged
- None of these