



MATHS

BOOKS - S CHAND IIT JEE

FOUNDATION

MATRICES

Solved Examples

1. Find p, q, r and s if

$$\begin{bmatrix} p + 4 & 2q - 7 \\ s - 3 & r + 2s \end{bmatrix} = \begin{bmatrix} 6 & -3 \\ 2 & 14 \end{bmatrix}$$



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2. If $P = \begin{bmatrix} -3 & 1 \\ 2 & 5 \end{bmatrix}$, $Q = \begin{bmatrix} 1 & 6 \\ -4 & 0 \end{bmatrix}$ and $R = \begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix}$ find the value of $4P - 2Q + 3R$.



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3. Find the matrix X such that $A + 3B + X = 0$, where $A = \begin{bmatrix} 2 & 6 \\ 5 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$



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Question Bank 14

1. The order of the matrix $\begin{bmatrix} -1 \\ 3 \\ 4 \end{bmatrix}$ is ,

A. 1×3

B. 3×1

C. 1×1

D. 3×3

Answer: B



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2. Which of the following pair of matrices are equal?

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

B. $[4 \ 5 \ 6], \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$

C. $\begin{bmatrix} 4 & 7 \\ 3 & 2 \end{bmatrix}, \begin{bmatrix} 3 + 1 & \sqrt{49} \\ \frac{7-1}{2} & \sqrt[3]{8} \end{bmatrix}$

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

Answer: C



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3. A square matrix A has 9 elements. What is the possible order of A ?

A. 1×9

B. 9×9

C. 3×3

D. 2×7

Answer: C



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4. The matrix $\begin{bmatrix} -12 \\ 10 \\ 13 \\ 4 \end{bmatrix}$ is a

A. square matrix

B. row matrix

C. column matrix

D. null matrix

Answer: C



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5. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 5 \end{bmatrix}$ is an

- A. unit matrix
- B. null matrix
- C. diagonal matrix
- D. row matrix

Answer: C



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6. Which of the following statements is true?

A. Every zero matrix is a square matrix

B. A unit matrix is a diagonal matrix

C. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is the identity matrix for

additionn of 2×2 matrix

D. $\begin{bmatrix} 4 & x \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ 1 & 0 \end{bmatrix}$ if $x=5$

Answer: B



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7. If $\begin{bmatrix} 2x & 3 \\ 0 & y - 1 \end{bmatrix} = \begin{bmatrix} x - 3 & 3 \\ 0 & 2 \end{bmatrix}$ then the values of x and y respectively are

A. $3, -3$

B. $-3, 3$

C. $-3, -3$

D. $3, 3$

Answer: B



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8. If $A = [a_{ij}]_{m \times n}$, $B = [b_{ij}]_{m \times n}$ then the element C_{23} of the matrix $C = A + B$ is

A. $a_{13} + b_{13}$

B. $a_{23} + b_{32}$

C. $a_{23} + b_{23}$

D. $a_{32} + b_{23}$

Answer: C



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9. Given matrix $A = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$ and $B = \begin{bmatrix} -2 \\ -1 \end{bmatrix}$

find the matrix X such that $X - A = B$

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

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

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

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

Answer: B



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10. If $A = \begin{bmatrix} x & y \\ z & w \end{bmatrix}$, $B = \begin{bmatrix} x & -y \\ -z & w \end{bmatrix}$
and $C = \begin{bmatrix} -2x & 0 \\ 0 & -2w \end{bmatrix}$ then $A + B + C$ is

a

A. identify matrix

B. null matrix

C. row matrix

D. column matrix

Answer: B



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11. If $\begin{bmatrix} 2 & -1 \\ 2 & 0 \end{bmatrix} + 2A = \begin{bmatrix} -3 & 5 \\ 4 & 3 \end{bmatrix}$ the matrix

A equals

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

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

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

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

Answer: B



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12. Given $A = \begin{bmatrix} 2 & -1 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$ and

$C = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$, find the matrix X such that

$$A + X = 2B + C.$$

A. $\begin{bmatrix} 5 & -7 \\ 2 & 6 \end{bmatrix}$

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

C. $\begin{bmatrix} -7 & 5 \\ 6 & 2 \end{bmatrix}$

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

Answer: C



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13. A 2×2 matrix whose elements a_{ij} are given by $a_{ij} = i - j$ is

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

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

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

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

Answer: B



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14. The values of x and y respectively if

$$\begin{bmatrix} 2x + y \\ 3x - 2y \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix} \text{ are :}$$

A. $x = -2, y = 1$

B. $x = -2, y = -1$

$$C. x = 2, y = 1$$

$$D. x = 2, y = -1$$

Answer: C



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15. Solve the matrix equation

$$\begin{bmatrix} 2 & 1 \\ 5 & 0 \end{bmatrix} - 3X = \begin{bmatrix} -7 & 4 \\ 2 & 6 \end{bmatrix}$$

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

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

$$\text{C. } X = \begin{bmatrix} 3 & -1 \\ -1 & -2 \end{bmatrix}$$

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

Answer: B



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Self Assessment Sheet 14

1. If the matrix is a square matrix and it contains 36 elements then the order of the matrix is

A. 4×4

B. 8×8

C. 6×6

D. 3×3

Answer: C



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2. The element in the second row and third

column of the matrix $\begin{bmatrix} 4 & 5 & -6 \\ 3 & -4 & 3 \\ 2 & 1 & 0 \end{bmatrix}$ is

A. 3

B. 1

C. 2

D. -4

Answer: A



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3. Given that $M = \begin{bmatrix} 3 & -2 \\ -4 & 0 \end{bmatrix}$ and
 $N = \begin{bmatrix} -2 & 2 \\ 5 & 0 \end{bmatrix}$ then $M + N$ is a

A. null matrix

B. unit matrix

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

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

Answer: B



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4. If $2 \begin{bmatrix} 3 & 4 \\ 5 & x \end{bmatrix} + \begin{bmatrix} 1 & y \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 10 & 5 \end{bmatrix}$ then

A. $x=0, y=-2$

B. $x=2,y=-8$

C. $x=-2,y=-8$

D. $x=2,y=8$

Answer: B



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5. If $\begin{bmatrix} x + y & a + b \\ a - b & x - y \end{bmatrix} = \begin{bmatrix} 5 & -1 \\ 3 & -5 \end{bmatrix}$ the the values of x, y, a, b are respectively.

A. $0,-5,1,2$

B. 0,5,1,-2

C. 0,5,-1,2

D. 0,-5,1,-2

Answer: B



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Unit Test 2

1. The simplified form of the rational

expression $\left(\frac{x^2}{x^2 - y^2} - 1\right)\left(\frac{x - y}{y} + 2\right)$ is

A. $\frac{x}{x + y}$

B. $\frac{y}{x + y}$

C. $\frac{y}{x - y}$

D. $\frac{x}{x - y}$

Answer: C



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2. $x + y = a$ and $xy = b$, then the value of

$$\frac{1}{x^3} + \frac{1}{y^3}$$

A. $a^3 - 3ab$

B. $\frac{a^3 + 3ab}{b^3}$

C. $\frac{a^3 - 3ab}{b^3}$

D. $a^3 + 3ab$

Answer: C



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3. If $a^2 = (b + c)$, $b^2 = (c + a)$, $c^2 = (a + b)$,

then the value of $\frac{1}{a+1} + \frac{1}{b+1} + \frac{1}{c+1}$ is

equal to

A. 1

B. -1

C. 0

D. $\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$

Answer: A



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4. If $\frac{a}{x} + \frac{y}{b} = 1$ and $\frac{b}{y} + \frac{z}{c} = 1$, then $\frac{x}{a} + \frac{c}{z}$ will be equal to: (a) 0 (b) $\frac{b}{y}$ (c) 1 (d) $\frac{y}{b}$

A. $\frac{y}{b}$

B. $\frac{b}{y}$

C. 0

D. 1

Answer: D



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5. The factors of $x^4 + x^2 + 25$ are

$$(x^2 + 3x + 5)(x^2 - 3x + 5)$$

$$(x^2 + 3x + 5)(x^2 + 3x - 5)$$

$$(x^2 + x + 5)(x^2 - x + 5) \text{ (d) none of these}$$

A. $(x^2 + 5)(x^2 - x + 5)$

B. $(x^2 + 5 + x)(x^2 + 5 - x)$

C. $(x^2 + 5 + 3x)(x^2 + 5 - 3x)$

D. $(x^2 + 5)^2$

Answer: C



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6. The factors of $(a^2 + 36b^2)^2 - 169a^2b^2$ are:

A. $(a + 13b)(a - 13b)$

B. $(a + 4b)(a + 9b)(a - 4b)(a - 9b)$

C. $(a + 6b)(a - 13b)(a + 13b)(a + 6b)$

D. $(a - 13b)(a + 6b)$

Answer: B



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7. One of the factors of $a^6 + b^6 - a^2b^4 - a^4b^2$ is

A. $a + 1$

B. $a^2 + b^2$

C. $a^3 + b^3$

D. $a^4 + b^4$

Answer: B



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8. In a number of three digits the units digit is double the tens' digit. The sum of the number and the number formed by reversing the digits is 1191 and the average of three digits is 5. What is the number?

A. 663

B. 378

C. 924

D. 843

Answer: B





9. A batsmen's average before the last two innings of a seasons was 66. He failed to score in those innings and his average dropped to 55. How many innings did he play that season.

A. 10

B. 11

C. 12

D. 8

Answer: C



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10. The solution of the equations:

$$3(x + 3y - 1) = 2(y - 3x + 1) \quad \text{and}$$

$$3(5y - 7x - 3) = 2(5x + 7y + 12) \text{ are}$$

A. $x = 1, y = 2$

B. $x = -1, y = 2$

C. $x = 1, y = -2$

D. $x = -1, y = -2$

Answer: B



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11. Some bananas are to be shared among a number of children. To give each child 9 bananas would required 15 more bananas. But if the share of each is 8 there are 10 bananas left over. How many babanas are there?

A. 200

B. 210

C. 120

D. 140

Answer: B



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12. The value of K for which the system of equations $x + 2y + 7 = 0$ and $2x + ky + 14 = 0$ have infinitely many solutions is

A. 2

B. 4

C. 6

D. 8

Answer: B



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13. Roots of the equations

$$x^2 + x(2 - p^2) - 2p^2 = 0 \text{ are}$$

A. $-p^2$ and -2

B. p^2 and -2

C. $-p^2$ and 2

D. p^2 and 2

Answer: B



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14. The roots of the equation $\frac{4}{x^2} = 1 + \frac{3}{x}$

are

A. $-1, -4$

B. $1, 4$

C. $1, -4$

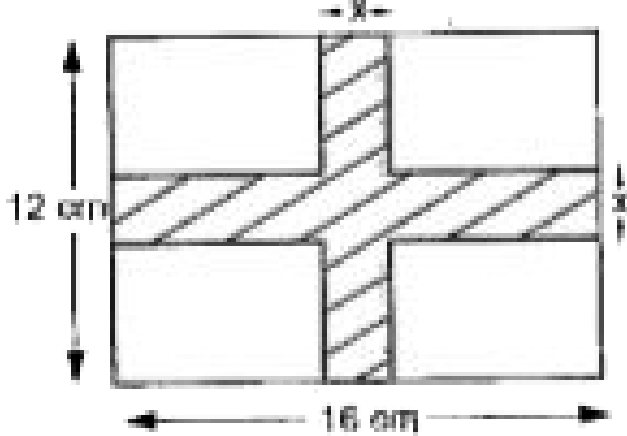
D. $-1, 4$

Answer: C



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15. Find the value of x if the shaded area is a half of the whole area in the given diagram.



- A. 4cm
- B. 6cm
- C. 3cm
- D. 2cm

Answer: A



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16. Find two numbers which are such that the sum of the first and twice the second and also the sum of their squares are equal to 5.

A. 1,3

B. 1,2

C. 2,3

D. 3,4

Answer: B



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17. If x and y are positive integers that satisfy $1 \leq x \leq 4$ and $3x + 2y \leq 13$, then the possible values of y are:

A. 1,2,3,4,5

B. 1,2,3,4,5,6

C. $\frac{1}{2}$, 3, 5

D. 2,3,4,5

Answer: C



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18. If $6 \leq x \leq 8$ then

A. $(x - 6)(x - 8) \geq 0$

B. $(x - 6)(x - 8) > 0$

C. $(x - 6)(x - 8) \leq 0$

D. $(x - 6)(x - 8) < 0$

Answer: C



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19. if $x^3 - \frac{1}{x^3} = 14$, then $x - \frac{1}{x} =$

A. 2

B. 3

C. 4

D. 5

Answer: A



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20. The LCM of the polynomials $(x^8 - y^8)$ and $(x^4 - y^4)(x + y)$ is

A. $(x^8 - y^8)$

B. $(x^8 - y^8)(x^4 - y^4)(x + y)$

C. $(x^8 - y^8)(x + y)$

D. $(x^4 - y^4)(x^8 - y^8)$

Answer: C



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