Sample Paper 1

AG-TMC-TS-TERM-1- 001

Time : 90 Minutes **Max Marks : 40**

General Instructions

1. *This question paper contains three sections – A, B and C. Each part is compulsory.*
2. *Section-A has **20** MCQs, attempt any **16** out of 20.*
3. *Section-B has **20** MCQs, attempt any **16** out of 20.*
4. *Section-C has **10** MCQs, attempt any **8** out of 10.*
5. *All questions carry equal marks.*
6. *There is no negative marking.*

SECTION-A

*In this section, attempt **any 16** questions out of questions 1-20. Each question is of 1 mark weightage.*

1. Principal value of $\operatorname{cosec}^{-1}\left(\frac{-2}{\sqrt{3}}\right)$ is equal to

(a) $-\frac{\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $-\frac{\pi}{2}$

2. The function $f(x) = \tan x - 4x$ is strictly decreasing on

(a) $\left(-\frac{\pi}{3}, \frac{\pi}{3}\right)$ (b) $\left(\frac{\pi}{3}, \frac{\pi}{2}\right)$ (c) $\left(-\frac{\pi}{3}, \frac{\pi}{2}\right)$ (d) $\left(\frac{\pi}{2}, \pi\right)$

3. If the matrices $A = [a_{ij}]$ and $B = [b_{ij}]$ and $C = [c_{ij}]$ are of the same order, say $m \times n$, satisfy Associative law, then

(a) $(A + B) + C = A + (B + C)$ (b) $A + B = B + C$

(c) $A + C = B + C$ (d) $A + B + C = A - B - C$

4. If $A = \begin{bmatrix} 3 & 5 \\ 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 17 \\ 0 & -10 \end{bmatrix}$, then $|AB|$ is equal to :

(a) 80 (b) 100 (c) – 110 (d) 92

5. Prinicpal value of $\tan^{-1}(\sqrt{3})$ is equal to

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{2\pi}{3}$ (d) $\frac{5\pi}{3}$

6. The angle of intersection of the curve $y^2 = x$ and $x^2 = y$ is

(a) $\tan^{-1}\left(\frac{3}{2}\right)$ (b) $\tan^{-1}\left(\frac{3}{4}\right)$ (c) $\tan^{-1}\left(\frac{1}{2}\right)$ (d) $\tan^{-1}\left(\frac{1}{5}\right)$

7. Choose the incorrect statement.

(a) A matrix A = [3] is a scalar matrix of order 1

(b) A matrix $B = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ is a scalar matrix of order 2

(c) A matrix $C = \begin{bmatrix} \sqrt{3} & 0 & 0 \\ 0 & \sqrt{3} & 0 \\ 0 & 0 & \sqrt{3} \end{bmatrix}$ of order 3 is not a scalar matrix

(d) None of the above

8. If A_{ij} denotes the cofactor of the element a_{ij} of the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$, then value of $a_{11}A_{31} + a_{13}A_{32} + a_{13}A_{33}$ is

(a) 0 (b) 5 (c) 10 (d) – 5

9. If $f(x) = \begin{cases} \dfrac{1-\sqrt{2}\sin x}{\pi - 4x}, & \text{if } x \neq \dfrac{\pi}{4} \\ a \quad , & \text{if } x = \dfrac{\pi}{4} \end{cases}$ is continuous at $\frac{\pi}{4}$, then a is equal to

(a) 4 (b) 2 (c) 1 (d) $\frac{1}{4}$

10. The constraints $-x_1 + x_2 \le 1$, $-x_1 + 3x_2 \le 9$, $x_1, x_2 \ge 0$ define on

(a) Bounded feasible space
(b) Unbounded feasible space
(c) Both bounded and unbounded feasible space
(d) None of these

11. $f(x) = \left(\dfrac{e^{2x} - 1}{e^{2x} + 1}\right)$ is

(a) an increasing function
(b) a decreasing function
(c) an even function
(d) None of these

12. If each of third order determinant of value Δ is multiplied by 4, then value of the new determinant is:

(a) Δ (b) 21Δ (c) 64Δ (d) 128Δ

13. Let $f(x) = \begin{cases} \dfrac{x^3 + x^2 - 16x + 20}{(x-2)^2} & , x \neq 2 \\ k & , x = 2 \end{cases}$

If f(x) is continuous for all x, then k =

(a) 3 (b) 5 (c) 7 (d) 9

14. Which of the following is correct statement?

(a) Diagonal matrix is also a scalar matrix
(b) Identity matrix is a particular case of scalar matrix
(c) Scalar matrix is not a diagonal matrix
(d) Null matrix cannot be a square matrix

15. If c_{ij} is the cofactor of the element a_{ij} of the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$, then write the value of $a_{32}.c_{32}$

(a) 110 (b) 22 (c) – 110 (d) – 22

16. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 - 2 = 0$ intersect at an angle of

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{6}$

17. In the interval [7, 9] the function f(x) = [x] is discontinuous at _______, where [x] denotes the greatest integer function

(a) 2 (b) 4 (c) 6 (d) 8

18. A vertex of bounded region of inequalities $x \ge 0, x + 2y \ge 0$ and $2x + y \le 4$ is

(a) (1, 1) (b) (0, 1) (c) (3, 0) (d) (0, 1)

19. If the area of a triangle ABC, with vertices A(1, 3), B(0, 0) and C(k, 0) is 3 sq. units, then the value of k is

(a) 2 (b) 3 (c) 4 (d) 5

20. The range of the function $f(x) = 2\sqrt{x-2} + \sqrt{4-x}$ is

(a) $\left(\sqrt{2}, \sqrt{11}\right)$ (b) $\left[\sqrt{2}, -\sqrt{10}\right)$

(c) $\left(\sqrt{3}, \sqrt{10}\right]$ (d) $\left[\sqrt{2}, \sqrt{10}\right]$

SECTION-B

*In this section, attempt **any 16** questions out of the questions 21-40. Each question is of 1 mark weightage.*

21. The line y = x + 1 is a tangent to the curve $y^2 = 4x$ at the point

(a) (1, 2) (b) (2, 1) (c) (1, –2) (d) (–1, 2)

22. Principal value of $\sec^{-1}(2)$ is equal to

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{2\pi}{3}$ (d) $\frac{5\pi}{3}$

23. The slope of the normal to the curve $y = 2x^2 + 3 \sin x$ at x = 0 is

(a) 3 (b) $\frac{1}{3}$ (c) – 3 (d) $-\frac{1}{3}$

24. If $A = [a_{ij}]$ is a matrix of order 4 × 5, then the diagonal elements of A are

(a) $a_{11}, a_{22}, a_{33}, a_{44}$ (b) $a_{55}, a_{44}, a_{33}, a_{22}, a_{11}$

(c) a_{11}, a_{22}, a_{33} (d) do not exist

25. $-\frac{2\pi}{5}$ is the principal value of

(a) $\cos^{-1}\left(\cos\frac{7\pi}{5}\right)$ (b) $\sin^{-1}\left(\sin\frac{7\pi}{5}\right)$

(c) $\sec^{-1}\left(\sec\frac{7\pi}{5}\right)$ (d) None of these

26. The maximum value of $\frac{\ln x}{x}$ in $(2, \infty)$ is

(a) 1 (b) e (c) 2/e (d) 1/e

27. If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, the minor of the element a_{23} is

(a) 5 (b) 6 (c) 7 (d) 8

28. The inequalities $5x + 4y \geq 20$, $x \leq 6$, $y \leq 4$ form

(a) A square (b) A rhombus
(c) A triangle (d) A quadrilateral

29. If p, q, r are 3 real numbers satisfying the matrix equation, $[p\,q\,r]\begin{bmatrix} 3 & 4 & 1 \\ 3 & 2 & 3 \\ 2 & 0 & 2 \end{bmatrix} = [301]$ then $2p + q - r$ equals :

(a) -3 (b) -1 (c) 4 (d) 2

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

(a) $\lambda \neq -17$ (b) $\lambda \neq -18$ (c) $\lambda \neq -19$ (d) $\lambda \neq -20$

31. At $x = \frac{5\pi}{6}$, $f(x) = 2\sin 3x + 3\cos 3x$ is

(a) maximum 1 (b) minimum
(c) zero (d) neither maximum nor minimum

32. The point of discontinuity of $f(x) = \tan\left(\frac{\pi x}{x+1}\right)$ other than $x = -1$ are :

(a) $x = 0$ (b) $x = \pi$
(c) $x = \frac{2m+1}{1-2m}$ (d) $x = \frac{2m-1}{2m+1}$

33. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$, then the value of $|\text{adj } A|$ is

(a) a^{27} (b) a^9 (c) a^6 (d) a^2

34. If a matrix has 8 elements, then which of the following will not be a possible order of the matrix?

(a) 1×8 (b) 2×4
(c) 4×2 (d) 4×4

35. The maximum vale of $P = x + 3y$ such that $2x + y \leq 20$, $x + 2y \leq 20$, $x \geq 0, y \geq 0$ is

(a) 10 (b) 60 (c) 30 (d) None

36. The point on the curve $x^2 = 2y$ which is nearest to the point (0, 5) is

(a) $(2\sqrt{2}, 4)$ (b) $(2\sqrt{2}, 0)$ (c) (0, 0) (d) (2, 2)

37. If a function f(x) is defined as $f(x)=\begin{cases}\dfrac{x}{\sqrt{x^2}}, & x\neq 0\\ 0, & x=0\end{cases}$ then :

(a) f(x) is continuous at x = 0 but not differentiable at x = 0
(b) f(x) is continuous as well as differentiable at x = 0
(c) f(x) is discontinuous at x = 0
(d) None of these.

38. Which of the following is not a vertex of the positive region bounded by the inqualities $2x + 3y \le 6$, $5x + 3y \le 15$ and $x, y \ge 0$

(a) (0, 2)
(b) (0, 0)
(c) (3, 0)
(d) None

39. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, then x is equal to

(a) 6
(b) ±6
(c) – 6
(d) 6, 6.

40. If $f(x)=\begin{cases} xe^{-\left(\frac{1}{|x|}+\frac{1}{x}\right)} & , x\neq 0\\ 0 & , x=0\end{cases}$ then f(x) is

(a) discontinuous every where
(b) continuous as well as differentiable for all x
(c) continuous for all x but not differentiable at $x = 0$
(d) neither differentiable nor continuous at $x = 0$

SECTION-C

*In this section, attempt **any 8** questions. Each question is of 1 mark weightage. Questions 46-50 are based on a case-study.*

41. Let $R = \{(3, 3) (5, 5), (9, 9), (12, 12), (5, 12), (3, 9), (3, 12), (3, 5)\}$ be a relation on the set $A = \{3, 5, 9, 12\}$. Then, R is:

(a) reflexive, symmetric but not transitive.
(b) symmetric, transitive but not reflexive.
(c) an equivalence relation.
(d) reflexive, transitive but not symmetric.

42. If R = {(x, y) : x is father of y}, then R is

(a) reflexive but not symmetric
(b) symmetric and transitive
(c) neither reflexive nor symmetric nor transitive
(d) Symmetric but not reflexive

43. The domain of the function
$\cos^{-1} \log_2 (x^2 + 5x + 8)$ is-

(a) [2, 3]
(b) [–3, –2]
(c) [–2, 2]
(d) [–3, 1]

44. If $\sin^{-1} x = \tan^{-1} y$, what is the value of $\dfrac{1}{x^2} - \dfrac{1}{y^2}$?

(a) 1
(b) –1
(c) 0
(d) 2

45. Domain of $\cos^{-1}[x]$ is

(a) [–1, 2]
(b) [–1, 2)
(c) (–1, 2]
(d) None of these

Case Study

For sport day activity the class teacher of class-XII measures the weight of students. The set of their weight is given as $W = \{40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50\}$.

Based on the above information answer the following:

46. If the relation R in set W define as $R = \{(x, y) : |x - y| = 1\}$ then R is

(a) Reflexive (b) Symmetric

(c) Transitive (d) Equivalence

47. If the relation R in set W define as $R = \{(x, y): x > y\}$ then R is

(a) Reflexive (b) Symmetric

(c) Transitive (d) Equivalence

48. The number of relations from W to W are

(a) 100 (b) 20

(c) 2^{100} (d) 2^{121}

49. The number of non-empty relation from W to W are

(a) 2^{10} (b) 2^{100}

(c) $2^{121} - 1$ (d) 99

50. If set A have m and set B have n elements then number of ordered pair $A \times B$ is

(a) $m + n$ (b) mn

(c) 2^{mn} (d) m^n

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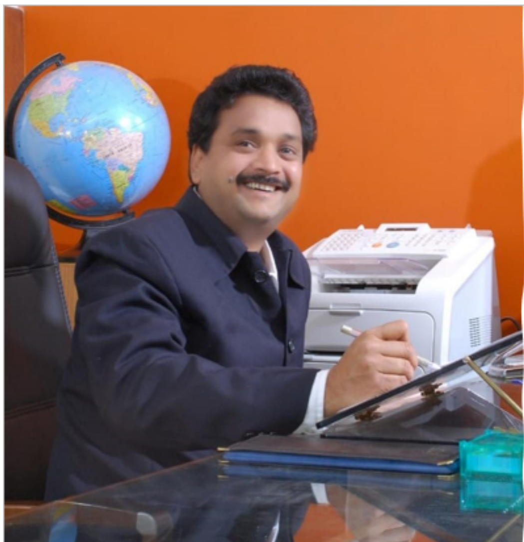


Target Mathematics by Dr. Agyat Gupta

Sample Paper 1

ANSWER SHEET CODE AG-TMC-TS-TERM-1-001

ANSWER KEYS

1	(a)	6	(b)	11	(a)	16	(c)	21	(a)	26	(d)	31	(d)	36	(a)	41	(d)	46	(b)
2	(a)	7	(c)	12	(c)	17	(d)	22	(b)	27	(c)	32	(c)	37	(c)	42	(c)	47	(c)
3	(a)	8	(a)	13	(c)	18	(d)	23	(d)	28	(d)	33	(c)	38	(d)	43	(b)	48	(d)
4	(b)	9	(d)	14	(b)	19	(a)	24	(d)	29	(a)	34	(d)	39	(b)	44	(a)	49	(c)
5	(b)	10	(b)	15	(a)	20	(d)	25	(b)	30	(a)	35	(d)	40	(c)	45	(b)	50	(c)

SOLUTIONS

1. **(a)** Let $\operatorname{cosec}^{-1}\left(\frac{-2}{\sqrt{3}}\right) = \theta$

$\Rightarrow \operatorname{cosec}\theta = \frac{-2}{\sqrt{3}} = -\operatorname{cosec}\frac{\pi}{3} = \operatorname{cosec}\left(\frac{-\pi}{3}\right)$

$\Rightarrow \theta = \frac{-\pi}{3} \in \left[\frac{-\pi}{2}, \frac{\pi}{2}\right] - \{0\}$

$\therefore$ Principal value of $\operatorname{cosec}^{-1}\left(\frac{-2}{\sqrt{3}}\right)$ is $\left(\frac{-\pi}{3}\right)$

2. **(a)** $f(x) = \tan x - 4x \Rightarrow f'(x) = \sec^2 x - 4$

When $\frac{-\pi}{3} < x < \frac{\pi}{3}$, $1 < \sec x < 2$

Therefore, $1 < \sec^2 x < 4$

$\Rightarrow -3 < (\sec^2 x - 4) < 0$

Thus, for $\frac{-\pi}{3} < x < \frac{\pi}{3}$, $f'(x) < 0$

Hence, f is strictly decreasing on $\left(\frac{-\pi}{3}, \frac{\pi}{3}\right)$

3. **(a)** Associative law: For any three matrices $A = [a_{ij}]$, $B = [b_{ij}]$ and $C = [c_{ij}]$ of the same order, say $m \times n$, $(A + B) + C = A + (B + C)$.

Now, $(A + B) + C = ([a_{ij}] + [b_{ij}]) + [c_{ij}]$

$= [a_{ij} + b_{ij}] + [c_{ij}] = [(a_{ij} + b_{ij}) + c_{ij}] = [a_{ij}] + [(b_{ij}) + (c_{ij})]$

$= [a_{ij}] + ([b_{ij}] + [c_{ij}]) = A + (B + C)$

4. **(b)**

5. **(b)** Let $\tan^{-1}(\sqrt{3}) = \theta \Rightarrow \tan\theta = \sqrt{3} = \tan\frac{\pi}{3}$

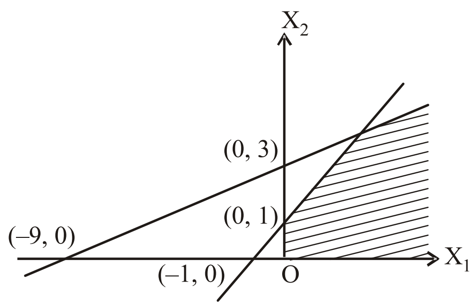
$\therefore$ Principal value of $\tan^{-1}\sqrt{3}$ is $\frac{\pi}{3}$

6. **(b)**

7. **(c)** $A = [3], B = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}, C = \begin{bmatrix} \sqrt{3} & 0 & 0 \\ 0 & \sqrt{3} & 0 \\ 0 & 0 & \sqrt{3} \end{bmatrix}$ are scalar matrices of order 1, 2 and 3, respectively.

8. **(a)** **9.** **(d)**

10. **(b)** It is clear from the graph, the constraints define the unbounded feasible space.



11. **(a)** $\because f(x) = \left(\frac{e^{2x} - 1}{e^{2x} + 1}\right) \therefore f(-x) = \frac{e^{-2x} - 1}{e^{-2x} + 1} = \frac{1 - e^{2x}}{1 + e^{2x}}$

$\Rightarrow f(-x) = \frac{-\left(e^{2x} - 1\right)}{e^{2x} + 1} = -f(x)$

$\therefore$ f(x) is an odd function.

Again, $f(x) = \frac{e^{2x} - 1}{e^{2x} + 1} = \frac{e^{2x}}{\left(1 + e^{2x}\right)^2} > 0, \forall x \in R$

$\Rightarrow$ f(x) is an increasing function.

12. **(c)** Value of the new determinant

$= (4)^{\text{order of det.}}\ \Delta = 4^3\Delta = 64\,\Delta.$

13. **(c)**

14. **(b)** Scalar matrix is a particular case of a diagonal matrix, where all the diagonal elements are same.

Thus, every diagonal matrix is not a scalar matrix. Identity matrix is a particular case of scalar matrix, since all diagonal elements are same and have the value 1.

By definition of scalar matrix, it is a diagonal matrix.

Null matrix is a matrix in which all elements are zero. Such a matrix can be of any order and any type.

15. **(a)**

16. **(c)** $x^3 - 3xy^2 + 2 = 0$

differentiating w.r.t. x : $3x^2 - 3x(2y)\frac{dy}{dx} - 3y^2 = 0$

$\Rightarrow \frac{dy}{dx} = \frac{3x^2 - 3y^2}{6xy}$ and $3x^2y - y^3 - 2 = 0$

differentiating w.r.t. x $\Rightarrow 3x^2\frac{dy}{dx} + 6xy - 3y^2\frac{dy}{dx} = 0$

$\Rightarrow \frac{dy}{dx} = -\left(\frac{6xy}{3x^2 - 3y^2}\right)$

Now, product of slope

$= \frac{3x^2 - 3y^2}{6xy} \times -\left(\frac{6xy}{3x^2 - 3y^2}\right) = -1$

$\therefore$ they are perpendicular. Hence, angle $= \pi/2$

17. **(d)** At $x = 8$,

$L.H.L = \lim_{x \to 8^-} f(x) = \lim_{x \to 8^-} [x]$

Put $x = 8 - h$. Then as $x \to 8$, $h \to 0$

$L.H.L = \lim_{h \to 0} [8 - h] = 7$ ....(i)

$R.H.L = \lim_{x \to 8^+} f(x) = \lim_{x \to 8^+} [x]$

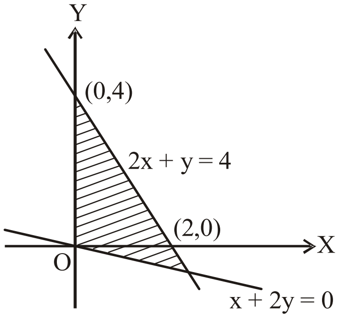
Put $x = 8 + h$. Then as $x \to 8$, $h \to 0$

$R.H.L = \lim_{h \to 0} [8 + h] = 8$ ....(ii)

From (i) and (ii) $L.H.L \neq R.H.L$

Therefore the function is discontinuous at x = 8, in the given interval.

18. **(d)**



19. **(a)**

20. **(d)** Clearly, domain of the function is [2, 4].

Now, $f'(x) = \frac{1}{\sqrt{x-2}} - \frac{1}{2\sqrt{4-x}}$

$f'(x) = 0$ or $\sqrt{x-2} = 2\sqrt{4-x}$

or $x - 2 = 16 - 4x$ or $x = \frac{18}{5}$

Now, $f(2) = \sqrt{2}, f\left(\frac{18}{5}\right) = 2\sqrt{\frac{18}{5} - 2} + \sqrt{4 - \frac{18}{5}} = \sqrt{10}$,

$f(4) = 2\sqrt{2}$

Hence, range of the function is $[\sqrt{2}, \sqrt{10}]$.

21. **(a)**

22. **(b)** Let $\sec^{-1}(2) = \theta \Rightarrow \sec\theta = 2 = \sec\frac{\pi}{3}$

$\Rightarrow \theta = \frac{\pi}{3} \in [0, \pi] - \left\{\frac{\pi}{2}\right\}$

$\therefore$ Principal value of $\sec^{-1}(2)$ is $\frac{\pi}{3}$

23. **(d)** $\because y = 2x^2 + 3\sin x \therefore \frac{dy}{dx} = 4x + 3\cos x$ at $x = 0$, $\frac{dy}{dx} = 3$,

$\therefore$ Slope $= 3 \Rightarrow$ Slope of normal is $= -\frac{1}{3}$

24. **(d)** The given matrix $A = [a_{ij}]$ is a matrix of order 4×5, which is not a square matrix.

$\therefore$ The diagonal elements of A do not exist.

25. **(b)** $\cos^{-1}\left(\cos\frac{7\pi}{5}\right) = \cos^{-1}\left\{\cos\left(2\pi - \frac{3\pi}{5}\right)\right\}$

$= \cos^{-1}\cos\left(\frac{3\pi}{5}\right) = \frac{3\pi}{5}$.

also, $\sin^{-1}\left(\sin\frac{7\pi}{5}\right) = \sin^{-1}\left\{\sin\left(\pi + \frac{2\pi}{5}\right)\right\}$

$= \sin^{-1}\left\{-\sin\frac{2\pi}{5}\right\} = \sin^{-1}\left\{\sin\left(-\frac{2\pi}{5}\right)\right\} = -\frac{2\pi}{5}$

and; $\sec^{-1}\left(\sec\frac{7\pi}{5}\right) = \sec^{-1}\left\{\sec\left(2\pi - \frac{3\pi}{5}\right)\right\}$

$= \sec^{-1}\left(\sec\frac{3\pi}{5}\right) = \frac{3\pi}{5}$.

26. **(d)** **27.** **(c)**

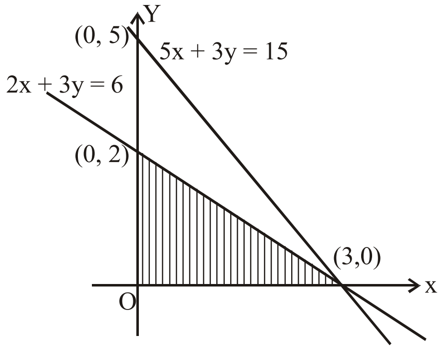
28. **(d)** Common region is quadrilateral.

29. **(a)** **30.** **(a)** **31.** **(d)** **32.** **(c)** **33.** **(c)**

34. **(d)** We know that, if a matrix is of order $m \times n$, then it has mn elements. Thus, to find all possible orders of a matrix with 8 elements, we will find all ordered pairs of natural numbers, whose product is 8. Thus, all possible ordered pair are (1, 8), (8, 1), (2, 4), (4, 2).

35. **(d)** **36.** **(a)** **37.** **(c)**

38. **(d)** Here (0, 2), (0, 0) and (3, 0) all are vertices of feasible region. Hence option (d) is correct.



39. **(b)** $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$

$\Rightarrow \; x^2 - 36 = 36 - 36 \Rightarrow \; x^2 = 36 \Rightarrow \; x = \pm 6$

40. **(c)** $f(0) = 0; \; f(x) = xe^{-\left(\frac{1}{|x|}+\frac{1}{x}\right)}$

R.H.L. $\lim\limits_{h\to 0}(0+h)e^{-2/h} = \lim\limits_{h\to 0}\dfrac{h}{e^{2/h}} = 0$

L.H.L. $\lim\limits_{h\to 0}(0-h)e^{-\left(\frac{1}{h}-\frac{1}{h}\right)} = 0$

therefore, $f(x)$ is continuous.

R.H.D $= \lim\limits_{h\to 0}\dfrac{(0+h)e^{-\left(\frac{1}{h}+\frac{1}{h}\right)} - 0}{h} = 0$

L.H.D. $= \lim\limits_{h\to 0}\dfrac{(0-h)e^{-\left(\frac{1}{h}-\frac{1}{h}\right)} - 0}{-h} = 1$

therefore, L.H.D. $\neq$ R.H.D.

$f(x)$ is not differentiable at $x = 0$.

41. **(d)**	**42.** **(c)**	**43.** **(b)**	**44.** **(a)**	**45.** **(b)**
46. **(b)**	**47.** **(c)**	**48.** **(d)**	**49.** **(c)**	**50.** **(c)**

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