MATHS

BOOKS - EDUCART PUBLICATION

CBSE TERM -1 SAMPLE PAPER 1

Section A

1. Find the value of $\sin\left[\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right]$

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

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

C. -1

D. 1

Answer: D

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2. The value of $k(k < 0)$ for which the function f defined as

f(x)= $\left\{\left(\frac{1-\cos kx}{x(\sin x)}, x \neq 0 \text{ or } \frac{1}{2}, x = 0\right\}\right.$,is

continous at x=0 is :

A. ± 1

B. -1

C. $+\frac{1}{2}$

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

Answer: B

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3. If $A = [a_{ij}]$ is a square matrix of order 2 such that $a_{ij} = \begin{cases} 1 & \text{when } i \neq j \\ 0 & \text{when } i = j \end{cases}$ that A^2 is :

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

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

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

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

Answer: D

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4. 4. Value of k, for which $A = \begin{bmatrix} k & 8 \\ 4 & 2k \end{bmatrix}$ is a singular matrix is:

a)4 b) -4

c) ± 4 d) 0

A. 4

B. -4

C. ± 4

D. 0

Answer: C

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5. Find the intervals in which the function f given

by $f(x) = x^2 - 4x + 6$ is strictly increasing:

$a)(-\infty, 2) \cup (2, \infty)$

$b)(2, \infty)$

$c)(-\infty, 2)$

$d)(-\infty, 2] \cup (2, \infty)$

A. $(-\infty, 2) \cup (2, \infty)$

B. $(2, \infty)$

C. $(-\infty, 2)$

D. $(-\infty, 2) \cup (2, \infty)$

Answer: B

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6. Given that A is a square matrix of order 2 and |A| = - 4, then ladj Al is equal to:

A. -4

B. 4

C. -16

D. 16

Answer: A

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7. v0

A. $(1, 1)$

B. $(1, 2)$

C. $(2, 2)$

D. $(3, 3)$

Answer: B

8. If $\begin{bmatrix} 2a+b & a-2b \\ 5c-d & 4c+3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$, then value of $a+b-c+2d$ is :

A. 8

B. 10

C. 4

D. -8

Answer: A

9. Find the equation of the normal to the curve $y = x + \frac{1}{x}, x > 0$ perpendicular to the line $3x - 4y = 7$.

A. $\left(2, \frac{5}{2}\right)$

B. $\left(\pm 2, \frac{5}{2}\right)$

C. $\left(-\frac{1}{2}, \frac{5}{2}\right)$

D. $\left(\frac{1}{2}, \frac{5}{2}\right)$

Answer: A

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10. $\sin(\tan^{-1}x)$, wheren $|x| < 1$ is equal to :

A. $\dfrac{x}{\sqrt{1-x^2}}$

B. $\dfrac{1}{\sqrt{1-x^2}}$

C. $\dfrac{1}{\sqrt{1+x^2}}$

D. $\dfrac{x}{\sqrt{1+x^2}}$

Answer: D

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11. Let the relation R in the set $A = \{x \in z : 0 \leq x \leq 12\}$ given by R= {(a, b) :la - bl is a multiple of 4}. Then [1], the equivalence class containing 1, is:

A. $\{1, 5, 9\}$

B. $\{0, 1, 2, 5\}$

C. ϕ

D. A

Answer: A

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12. If $e^{x} + e^{y} = e^{x+y}, then \frac{dy}{dx} =$

A. e^{y-x}

B. e^{x+y}

C. $-e^{y-x}$

D. $2e^{x-y}$

Answer: C

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13. Given that matrices A and B are of order $3 \times n$ and $m \times 5$ respectively, then the order of matrix C = 5A + 3B is:

A. 3×5 and $m = n$

B. 3×5

C. 3×3

D. 5×5

Answer: B

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14. If y = 5 cos x - 3 sin x, then $\frac{d^2y}{dx^2}$ is equal to :

A. $-y$

B. y

C. 25y

D. 9y

Answer: A

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15. For matrix $A = \begin{bmatrix} 2 & 5 \\ -11 & 7 \end{bmatrix}$ (adj A)' is equal to :

A. $\begin{bmatrix} -2 & -5 \\ 11 & -7 \end{bmatrix}$

B. $\begin{bmatrix} 7 & 5 \\ 11 & 2 \end{bmatrix}$

C. $\begin{bmatrix} 7 & 11 \\ -5 & 2 \end{bmatrix}$

D. $\begin{bmatrix} 7 & -5 \\ 11 & 2 \end{bmatrix}$

Answer: C

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16. Find the points on the curve $\frac{x^2}{9} + \frac{y^2}{16} = 1$ at which the tangents are parallel to the x-axis and y-axis.

A. $(0, \pm 4)$

B. $(\pi 4, 0)$

C. $(\pm 3, 0)$

D. $(0, \pm 3)$

Answer: C

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17. Given that $A = [a_{ij}]$ is a square matrix of order 3×3 and $|A| = -7$, then the value of $\sum_{i=1}^{3} a_{i2}A_{i2}$ where A_{ij} denotes the cofactor of element a_{ij} is:

A. 7

B. -7

C. 0

D. 49

Answer: B

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18. If $y = \log(\cos e^x), then \frac{dy}{dx}$ is:

A. $\cos e^{x-1}$

B. $e^{-x} \cos e^x$

C. $e^x \sin e^x$

D. $-e^x \tan e^x$

Answer: C

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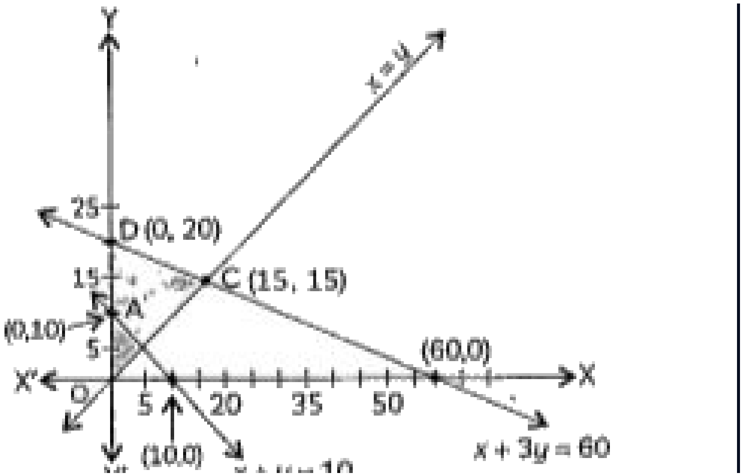
19. Based on the given shaded region as the feasible region in the graph, at which point(s) is the objective function Z = 3x + 9y is maximum?



A. Point B

B. Point C

C. Point D

D. every point on the line segment CD

Answer: C

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20. The least value of the function $f(x) = 2\cos x + x$ in the closed interval $\left[0, \frac{\pi}{2}\right]$ is

A. 2

B. $\frac{\pi}{6} + \sqrt{3}$

C. $\frac{\pi}{2}$

D. The least value does not exist.

Answer: C

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Section B

1. The function $f: R \to R$ defined as $f(x) = x^3$ is:

A. One-one but not onto

B. Not one-one but onto

C. Neither one-one nor onto

D. One-one and onto

Answer: D

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2. If $x = a\sec\theta, y = b\tan\theta,$ then $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{6}$ is :

A. $\frac{-3\sqrt{3b}}{a^2}$

B. $\frac{-2\sqrt{3b}}{a}$

C. $\dfrac{-3\sqrt{3b}}{a}$

D. $\dfrac{-b}{-3\sqrt{3b}}$

Answer: C

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3. The derivative of $\sin^{-1}\left(2x\sqrt{1-x^2}\right)$ w.r.t. $\sin^{-1}x, \dfrac{1}{\sqrt{2}} < x < 1$ is :

A. 2

B. $\dfrac{\pi}{2} - 2$

C. $\frac{\pi}{2}$

D. -2

Answer: A

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4. If

$$A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$$

, then :

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

B. $A^{-1} = 6B$

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

D. $B^{-1} = \frac{1}{6}A$

Answer: D

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5. Find the intervals in which the function f given by $f(x) = 2x^3 - 3x^2 - 36x + 7$is (a) strictly increasing (b) strictly decreasing

A. Strictly increasing in $(-\infty, -2)$ and strictly decreasing in $(-2, \infty)$

B. Strictly decreasing in (-2, 3)

C. Strictly decreasing in $(-\infty, 3)$ and strictly increasing in $(3, \infty)$

D. Strictly decreasing in $(-\infty, -2) \cup (3, \infty)$

Answer: B

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6. Simplest form of

$$\tan^{-1}\left(\frac{\sqrt{1+\cos x}+\sqrt{1-\cos x}}{\sqrt{1+\cos x}-\sqrt{1-\cos x}}\right), \pi < x < \frac{3\pi}{2}$$

is :

A. $\frac{\pi}{4} - \frac{x}{2}$

B. $\frac{3\pi}{2} - \frac{x}{2}$

C. $-\frac{x}{2}$

D. $\pi - \frac{x}{2}$

Answer: A

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7. Given that A is a non-singular matrix of order 3 such that $A^2 = 2A$, then value of $|2A|$ is:

A. 4

B. 8

C. 64

D. 16

Answer: C

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8. The value of b for which the function $f(x) = x + \cos x + b$ is strictly decreasing over R is:

a) $b < 1$ b) $b \leq 1$ c) No value of b exists d) $b \geq 1$

A. $b < 1$

B. No value of b exists

C. $b \leq 1$

D. $b \geq 1$

Answer: B

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9. Let R be a relation on the set N given by $R = \{(a,\ b) : a = b - 2,\ b > 6\}$. Then, $(2,\ 4) \in R$ (b) $(3,\ 8) \in R$ (c) $(6,\ 8) \in R$ (d) $(8,\ 7) \in R$

A. $(2, 4) \in R$

B. $(3, 8) \in R$

C. $(6, 8) \in R$

D. $(8, 7) \in R$

Answer: C

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10. The point(s), at which the function f given by

$f(x) = \begin{cases} (x) & x < 0 \\ -1 & x \geq 0 \end{cases}$ is continuous, is/are:

A. $x \in R$

B. $x = 0$

C. $x \in R - \{0\}$

D. $x = -1$ and 1

Answer: A

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11. If $A=\begin{bmatrix}0 & 2\\ 3 & -4\end{bmatrix}$ and $kA=\begin{bmatrix}0 & 3a\\ 2b & 24\end{bmatrix}$,

then the values of k,a,b are respectively.

A. $-6,\ -12,\ -18$

B. $-6,\ -4,\ -9$

C. $-6, 4, 9$

D. $-6, 12, 18$

Answer: B

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12. A linear programming problem is as follows:

Minimize Z = 30x + 50y

subject to the constraints,

$3x + 5y \geq 15$

$2x + 3y \leq 18$

$x \geq 0, y \leq 0$

In the feasible region, the minimum value of Z occurs at:

A. a unique point

B. no point

C. infinitely many points

D. two points only

Answer: D

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13. 1.The area of a trapezium is defined by function f and given by $f(x) = (10 + x)\sqrt{(100 - x^2)}$, then the area when it is maximised is: a). $75cm^2$ b). $7\sqrt{3cm^2}$ c). $75\sqrt{3cm^2}$ d). $5cm^2$

A. $75cm^2$

B. $7\sqrt{3}cm^2$

C. $75\sqrt{3}cm^2$

D. $5cm^2$

Answer: C

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14. If A square matrix such that $A^2 = A$, then $(I+A)^3 - 7A$ is equal to :

A. A

B. $I + A$

C. I-A

D. I

Answer: C

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15. If $\tan^{-1} x = y$ then :

A. $-1 < y < 1$

B. $\frac{-\pi}{2} \leq y \leq \frac{\pi}{2}$

C. $\frac{-\pi}{2} < y < \frac{\pi}{2}$

D. $y \in \left\{ -\frac{\pi}{2}, \frac{\pi}{2} \right\}$

Answer: C

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16. Let A = {1, 2, 3}, B = {4, 5, 6, 7} and let f = {(1, 4), (2,5), (3, 6)} be a function from A to B. Based on the given information, f is best defined as:

A. Surjective function

B. Injective function

C. Bijective function

D. function

Answer: B

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17. For $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then $14A^{-1}$ is given by :

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

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

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

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

Answer: B

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18. Find the point on the curve $y = x^3 - 11x + 5$ at which the tangent is $y = x \quad 11$.

A. $(-2, 19)$

B. $(2, -9)$

C. $(\pm 2, 19)$

D. $(-2, 19)$ and $(2, -9)$

Answer: B

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19. Given that $A = \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ and $A^2 = 3I$ then :

A. $1 + \alpha^2 + \beta\gamma = 0$

B. $1 - \alpha^2 + \beta\gamma = 0$

C. $3 - \alpha^2 - \beta\gamma = 0$

D. $3 + \alpha^2 + \beta\gamma = 0$

Answer: C

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20. For an objective function Z = ax + by, where $a, b > 0$, the corner points of the feasible region determined by a set of constraints (linear inequalities) are (0, 20). (10, 10), (30, 30) and (0, 40). The condition on a and b such that the maximum z occurs at both the points (30, 30) and (0, 40) is:

A. $b - 3a = 0$

B. $a = 3b$

C. $a + 2b = 0$

D. $2a - b = 0$

Answer: A

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Section C

1. The line $y = mx + 1$ is a tangent to the curve $y^2 = 4x$, if the value of m is (a) 1 (b) 2 (c) 3 (d) 1/2

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

B. 1

C. 2

D. 3

Answer: B

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2. What is the minimum value off $|x(x-1)+1|^{1/3}$, where $0 \leq x \leq 1$?

A. 0

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

C. 1

D. $3\sqrt{\frac{1}{3}}$

Answer: C

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3. In a linear programming problem, the constraints on the decision variables x and y are $x - 3y \geq 0, y \geq 0, 0 \leq x \leq 3$. The feasible region:

A. is not in the first quadrant

B. is bounded in the first quadrant

C. is unbounded in the first quadrant

D. does not exist

Answer: B

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4. Let

$$\Delta = \begin{vmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{vmatrix} 0, \leq \theta \leq 2\pi.$$ The

A. $|A| = 0$

B. $|A| \in (2, \infty)$

C. $|A| \in (2, 4)$

D. $|A| \in [2, 4]$

Answer: D

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