MATHS

BOOKS - EDUCART PUBLICATION

SAMPLE PAPER (SELF-ASSESSMENT) -10

Section A

1. If a set A contain 7 elements and the set B contain 9 elements, then the number of one-one and onto , mappings from A to B is :

A. 5040

B. 63

C. 16

D. 0

Answer:

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2. Find the value of

$$\tan^{-1}\left(\tan\frac{7\pi}{6}\right)+\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$$

A. $\frac{3\pi}{2}$

B. $\frac{\pi}{6}$

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

D. $\frac{5\pi}{6}$

Answer:

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3. The order of the matrices $\begin{bmatrix}1&2&3\\4&5&-1\end{bmatrix}, \begin{bmatrix}2&4\\9&2\\6&3\\4&1\end{bmatrix}, \begin{bmatrix}4&5&6\\3&2&1\\9&8&7\end{bmatrix}$

respectively are :

A. $3 \times 2, 2 \times 4, 3 \times 3$

B. $2 \times 3, 2 \times , 3 \times 3 \times 3$

C. $2 \times 3, 2 \times 4, 3 \times 3$

D. $2 \times 3, 4 \times 2, 3 \times 3$

Answer:

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4. If A is a square matrix of order 2, $|A| \neq 0$ and $|4A| = k|A|$, then the value of k is :

A. 4

B. 8

C. 16

D. 2

Answer:

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5. If $x^2 + y^2 = \sin(x + y)$, then $\frac{dy}{dx} =$

A. $\frac{\cos(x + y) - 2x}{2y - \cos(x + y)}$

B. $\frac{x - \cos(x + y)}{y - \cos(x + y)}$

C. $\frac{2x + \cos(x + y)}{2y - \cos(x + y)}$

D. $\frac{c + \cos(x + y)}{2y + \cos(x + y)}$

Answer:

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6. In the interval $\left(0, \frac{\pi}{2}\right)$ the function $f(x) = \cos^2 x$ is :

A. strictly decreasing

B. strictly increasing

C. increasing

D. decreasing

Answer:

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7. Find the point on the curve $y = (x-2)^2$ at which the tangent is parallel to the chord joining the points (2,0) and (4,4).

A. $(2, 0)$

B. $(3, 1)$

C. $(0, 2)$

D. $(5, 6)$

Answer:

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8. For the system for linear inequations $x + y \leq 6, 3x + 5y \geq 15, x \geq 0, y \geq 0,$ If $Z = 3x + 2y,$ then the maximum value of Z occurs at :

A. one point

B. two points

C. no points

D. infinitely many points

Answer:

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9. If the points $(2, -3), (k, -1)$ and $(0, 4)$ are collinear, then the value of k is :

A. 0

B. 1

C. $\frac{10}{7}$

D. $\frac{7}{10}$

Answer:

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10. $\sin\left(\cot^{-1}\left(\frac{3}{4}\right)\right) = \cos\left(\tan^{-1} x\right)$,find the value of x .

A. $\frac{5}{3}$

B. $\frac{4}{5}$

C. $\frac{3}{5}$

D. $\frac{3}{4}$

Answer:

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11. Let A be a set of all points in a plane and R be a relation on A defined as $R = \{(a, b) :$ Distnace between points a and b is less than 5 units$\}$. Then R is

A. an equivalence relation

B. reflective, symmetric but not transitive

C. reflexive, transitive but not symmetric

D. symmetric only

Answer:

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12. The positive real value of x and y if $(xI + yA)^2 = A$, where $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$ and I is an mayri of order 2, are :

A. $x = \frac{1}{\sqrt{2}}, y = \frac{1}{\sqrt{2}}$

B. $x = \frac{3}{2}, y = \frac{1}{2}$

C. $x = 1, y = 1$

D. $x = 0, y\frac{3}{2}$

Answer:

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13. The cofacor matrix of $A = \begin{bmatrix} 1 & -5 \\ 3 & -7 \end{bmatrix}$ is :

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

B. $\begin{bmatrix} -7 & -3 \\ 5 & 1 \end{bmatrix}$

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

D. $\begin{bmatrix} 7 & 3 \\ -5 & -1 \end{bmatrix}$

Answer:

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14. For the function $f(x) = \dfrac{1}{x^2 + 2}$:

A. $x = 0$ is a point of local minima.

B. $x = 2$ is a point of local minima.

C. $x = 2$ is a point of local maxima.

D. x =0 is a point of local maxima.

Answer:

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15. If $y = f\left(x^2\right)$ and $f'(x) = e^{\sqrt{x}}$, then find $\dfrac{dy}{dx}$

A. e^x

B. $2xe^x$

C. $\dfrac{x}{2}e^{\sqrt{x}}$

D. $x^2e^{\sqrt{x}}$

Answer:

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16. If $2\begin{bmatrix}1 & 3\\ 0 & x\end{bmatrix}+\begin{bmatrix}y & 0\\ 1 & 2\end{bmatrix}^T=\left\{\begin{bmatrix}5 & 6\\ 1 & 8\end{bmatrix}^T\right\}^T$, then the values of x, y respectively are :

A. $3, 2$

B. $1, 5$

C. $3, 3$

D. $4, 1$

Answer:

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17. Let R be the relation in the set N given by $R=\{(a, b), a-b=5, a\leq 6\}$. Then :

A. $(1, 5) \in R$

B. $(5, 0) \in R$

C. $(4, -1) \in R$

D. $(6, 1) \in R$

Answer:

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18. The equation of normal to the curve $y = x^2 + 2$ at point (1,1) is :

A. $x + y = 0$

B. $x + 2y - 3 = 0$

C. $4x - y + 5 = 0$

D. $2x + 3y - 6 = 0$

Answer:

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19. If the matrix $A = \begin{bmatrix} 6 & x & 2 \\ 2 & -1 & 2 \\ -10 & 5 & 2 \end{bmatrix}$ is singular, then the values of x is :

A. -3

B. -1

C. 1

D. 3

Answer:

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Section B

1. The corneer points of a feasible region, determined by a system of linear inequations, are $(0, 0), (1, 0), (4, 3), (2, 1)$ and $(0, 1)$. If the objective function is $Z = 2x - 3y$, then the minimum value of Z is :

A. -4

B. -2

C. -6

D. -5

Answer:

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2. If the tangent to the curve $y = 2x^2 + 4x + 9$ at origin is prallel to the line $12x - ay + 3 = 0,$ then the value of a is

A. 1

B. 2

C. 3

D. 4

Answer:

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3. The value of $\sin^{-1}(\sin 1550^\circ)$ is :

A. 1550°

B. 110°

C. 70°

D. 180°

Answer:

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4. The differential, coefficient of $\sec\left(\tan^{-1} x\right)$ is

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

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

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

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

Answer: C

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5. The function $f(x) = 4x^3 - 18x^2 + 27x + 49$ is increasing in :

A. $(-\infty, 1)$

B. $(1, 2)$

C. $(2, \infty)$

D. R

Answer:

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6. Let R be a relation on a set $A = \{1, 2, 3, 4, 5\}$ defined as $R = \{(a, b) : |a^2 - b^2| < 8\}$. Then the reation R is

A. $\{(1, 1), (2, 2), (3, 3), (4, 4), (5, 5)\}$

B. $\{(1, 2), (2, 3), (3, 4), (4, 5)\}$

C.

$\{(1, 1), (1, 2), (2, 1), (2, 2), (2, 3), (3, 2), (3, 3), (3, 4), (4, 3), (4, 4), (5$

D.

$\{(1, 2), (2, 1), (2, 3), (2, 4), (1, 3), (3, 1), (3, 2), (3, 3), (3, 4), (4, 3), (4$

Answer:

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7. If the elements of a 2×2 matrix A are given as $a_{i,j} = \begin{cases} 1, & i \neq j \\ 0, & i = j \end{cases}$, then the matrix A is :

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

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

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

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

Answer:

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8. The angle of intersection of the curves $xy = a^2$ and $x^2 - y^2 = 2a^2$ is :

A. 0°

B. 45°

C. 90°

D. 30°

Answer: C

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9. The values of a for which the finction $f(x) = \sin x - ax + 3$ strictly decreases on R, are :

A. $(-\infty, -1)$

B. $(-\infty, 1)$

C. $(1, \infty)$

D. $(-1, \infty)$

Answer:

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10. For the functioin

$y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \ldots \infty}}}$ $\frac{dy}{dx}$ is :

A. $\frac{\cos x}{2y - 1}$

B. $\frac{\cos y}{2x - 1}$

C. $\frac{\sin x}{2y-1}$

D. $\frac{\sin y}{2x-1}$

Answer: A

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11. Find AB if $A = \begin{bmatrix} 2 & 1 & 3 \\ 2 & 9 & 2 \\ 7 & 4 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

A. $\begin{bmatrix} 2 & 1 & 3 \\ 2 & 9 & 2 \\ 7 & 4 & 3 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 3 & 1 \\ 2 & 2 & 9 \\ 7 & 3 & 4 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 2 & 3 \\ 9 & 2 & 2 \\ 4 & 7 & 3 \end{bmatrix}$

D. $\begin{bmatrix} 3 & 2 & 1 \\ 2 & 2 & 9 \\ 3 & 7 & 4 \end{bmatrix}$

Answer:

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12. If $A = \begin{bmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{bmatrix}$, then inverse of matrix A will exist if :

A. $\lambda = 2$

B. $\lambda \neq -2$

C. $\lambda \neq -\frac{8}{5}$

D. $\lambda = \frac{9}{4}$

Answer:

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13. Classify the following functions f(x) defined in $R \to R$ as injective , surjective , both or none .

$f(x) = x^2$

A. one-one

B. one-one and onto

C. neither one-one nor onto

D. onto

Answer:

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14. The maximum value of the function $f(x) = -2x^2 + 8x + 15$ is :

A. 23

B. 21

C. 19

D. 14

Answer:

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15. If $\begin{vmatrix} 2x & x+3 \\ 2(x+1) & x+1 \end{vmatrix} = \begin{vmatrix} 3 & 3 \\ 1 & 5 \end{vmatrix}$, then the value of x is :

A. 0

B. -1

C. -2

D. -3

Answer:

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16. For any square matrix of order 2, if A (adj A) $= \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$, then the value of |A| is :

A. 4

B. 8

C. 2

D. 16

Answer:

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17. If $x = 2\cos\theta - \cos 2\theta$ and $y = 2\sin\theta - \sin 2\theta$, then $\frac{dy}{dx}$=

A. $\cos 3\theta$

B. $\cos ec\left(\frac{3\theta}{2}\right)$

C. $\tan\left(\frac{3\theta}{2}\right)$

D. $\sec 3\theta$

Answer:

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18. If the volume of a box is given as $V(x) = \frac{1}{4}\left(a^2x - x^3\right)$, then the maximum value of the box (in cu. Units) is :

A. $\frac{a^3}{6\sqrt{3}}$

B. $\frac{a^3}{2\sqrt{3}}$

C. $a^2 - 4$

D. $\frac{a}{a^2 + 4}$

Answer:

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19. If $\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = A + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix}$, then the matrix A is :

A. $\begin{bmatrix} 8 & -3 & 5 \\ -2 & -3 & -6 \end{bmatrix}$

B. $\begin{bmatrix} -8 & 3 & -5 \\ 2 & 3 & 6 \end{bmatrix}$

C. $\begin{bmatrix} 10 & 1 & 3 \\ -2 & 5 & 12 \end{bmatrix}$

D. Does not exist

Answer:

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20. Find the equation of the tangent to the curve $\left(1+x^2\right)y=2-x$, where it crosses the x-axis.

A. $x+5y=2$

B. $x-5y=2$

C. $5x-y=2$

D. $5x+y=2$

Answer: A

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Section C

1. The simplified form of $\tan^{-1}\left(\frac{\sqrt{1-x^2}}{x}\right)$ is :

A. $\sin^{-1} x$

B. $\cos^{-1} x$

C. $\sec^{-1} x$

D. $\text{cosec}^{-1} x$

Answer:

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2. If $y = 3\cos(\log x) + 4\sin(\log x)$, then $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} =$

A. y

B. $-y^2$

C. $\frac{1}{y}$

D. $-y$

Answer: D

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3. For the function $f(x) = \frac{x+3}{x-5}$ to be a bijective function, the domain and range, respectively of f (x) must be :

A. $R - \{3\}, R - \{5\}$

B. $R, R,$

C. $R - \{-3\}, R - \{5\}$

D. $R - \{5\}, R - \{1\}$

Answer:

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

A. $\frac{1}{20}\begin{bmatrix} 37 & 17 \\ 36 & 16 \end{bmatrix}$

B. $\frac{1}{20}\begin{bmatrix} 16 & -17 \\ -36 & 37 \end{bmatrix}$

C. $\frac{1}{20}\begin{bmatrix} -37 & 17 \\ 36 & -16 \end{bmatrix}$

D. $\frac{1}{20}\begin{bmatrix} 16 & 17 \\ 36 & 37 \end{bmatrix}$

Answer:

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5. If $y = \log x^x$, then $\frac{dy}{dx} =$

A. $x^x(1 + \log x)$

B. $\log\left(\frac{x}{e}\right)$

C. $\log\left(\frac{e}{x}\right)$

D. $\log(ex)$

Answer:

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