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MATHS

BOOKS - EDUCART PUBLICATION

SAMPLE PAPER 11

Section A

1. $x\sqrt{1+y}+y\sqrt{1+x}=0$, then $\frac{dy}{dx}=$

A. $\frac{1}{1+x^2}$

B. $\frac{xy}{1-y}$

C. $-\frac{1}{(1+x^2)}$

D. $-\frac{xy}{(1+x)^2}$

Answer:

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2. Let R be a relation is multiple of from the set A={1,2,3} to B={4,10,15}. Then, the set of ordered pairs corresponding to R are :

A. $\{(2,4),(2,10),(3,15)\}$

B. $\{(1, 4), (1, 10), (1, 15)\}$

C. $A \times B$

D.

$\{(1, 4), (1, 10), (1, 15), (2, 4), (2, 10), (3, 15)\}$

Answer:

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3. If $X + Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$,

then the matrix X is :

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

B. $\begin{bmatrix} 2 & 0 \\ 2 & 2 \end{bmatrix}$

C. $\begin{bmatrix} 21 & 0 \\ 6 & 15 \end{bmatrix}$

D. $\begin{bmatrix} 7 & 0 \\ 0 & 15 \end{bmatrix}$

Answer:

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4. If $x + y = k$ is a normal to the parabola $y^2 = 12x$, then the value of k is-

A. 3

B. 6

C. 9

D. 18

Answer:

5. The area of triangle whose vertices are (2,3), (3,2) and (1,8) is :

A. 1 sq. units

B. 2 sq. units

C. 3 sq. units

D. 4 sq. units

Answer:

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6. Rectangles with perimeter 40 metres will have maximum area, if :

A. Length = Breadth

B. Length = 2 (Breadth)

C. Length $= \frac{1}{2}$ (Breadth)

D. Length $= \frac{1}{4}$ (Breadth)

Answer:

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7. If the function f defined as $f(x) = \begin{cases} \frac{1-\cos 4x}{8x^2}, x \neq 0 \\ \text{k} \quad , \quad x = 0 \end{cases}$ is continuous at $x = 0$, then the value of k is :

A. 0

B. 1

C. 4

D. 7

Answer:

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8. If $\tan^{-1}(-\sqrt{3}) + \cot^{-1} x = \pi$, then the value of x is :

A. 0

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

C. $\sqrt{3}$

D. 1

Answer:

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9. If $\begin{bmatrix} -2x+y \\ x+y+z \\ x+y \end{bmatrix} = \begin{bmatrix} -3 \\ 3 \\ 3 \end{bmatrix}$, then the respective value of x,y and z are :

A. 0,1,2

B. 1,2,0

C. 2,1,0

D. 2,0,1

Answer:

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10. If $\Delta = \begin{vmatrix} 1 & bc & a \\ 1 & ca & b \\ 1 & ab & c \end{vmatrix}$, then minor of element ab is :

A. $a - b$

B. $c\left(b^2 - c^2\right)$

C. $b - a$

D. $c\left(a^2+b^2\right)$

Answer:

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11. The slope of tangent to the curve $x^{3/2}+y^{3/2}=3$ at point (1,1) is :

A. -3

B. -1

C. 1

D. 3

Answer:

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12. If $y = (2 + 3\sin x)(3 - 2\cos x)$, then $\frac{dy}{dx} =$

A. $4\sin x - 6\cos x + 9\sin 2x$

B. $2\cos x + 3\sin x + 5\sin 2x$

C. $6\sin x - 4\cos x - 3\cos 2x$

D. $4\sin x + 9\cos x - 6\cos 2x$

Answer:

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13. If $A = \begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix}$, then the value of $|3A|$ is :

A. 6

B. 30

C. 18

D. 90

Answer:

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14. Let $f: X \to Y$ be a function. Define a relation R in X given by $R = \{(a, b) : f(a) = f(b)\}$. Examine if R is an equivalence relation.

A. reflexive

B. symmetric

C. transitive

D. an equivalence relation

Answer: D

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15. Find all the points of local maxima and local minima of the function $f(x) = (x-1)^3(x+1)^2$

A. $x = -1, 1$ are points of local maxima and $x = -\frac{1}{5}$ is a point of local minima.

B. $x = -1$ is point of local maxima and $x = 1, -\frac{1}{5}$ are points of local minima.

C. $x = -1$ is a point of local maxima and $x = -\frac{1}{5}$ is a point of local minima.

D. $x = 1$ is a point of local maxima and $x = -\frac{1}{5}$ is a point of local minima.

Answer:

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16. If $A^3 - A^2 - 3A - I_3 = O$ and $A^2 = A$ then the inverse of matrix A is :

A. 2A

B. $-3I$

C. $-\frac{1}{5A}$

D. I

Answer:

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

A. $a\tan^{-1}x$

B. $\frac{1}{a}\sec^{-1}x$

C. $\frac{1}{2}\cos^{-1}\left(\frac{a}{x}\right)$

D. $\frac{1}{2}\sin^{-1}\left(\frac{x}{a}\right)$

Answer:

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18. The derivative of $\sec(e^x)$ with respect to e^x is

:

A. $e^x \sec(e^x)\tan(e^x)$

B. $\tan^{2+1}(e^x)$

C. $\sec(e^x)\tan(e^x)$

D. $e^{2x}\sec^2(e^x)$

Answer:

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Section B

1. If $\sin\left(\cot^{-1}(1-x)\right) = \cos\left(\tan^{-1}(-x)\right)$, then x is

A. -1

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

C. 0

D. 1

Answer:

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2. If $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = \lambda A$, then the value of λ is :

A. 1

B. 2

C. 4

D. 8

Answer:

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3. If $A = \begin{bmatrix} 1 & 2 \\ 3 & -1 \end{bmatrix}$ and $\mathrm{B} = \begin{bmatrix} 1 & 3 \\ -1 & 1 \end{bmatrix}$, then matrix AB is a :

A. singular matrix

B. identity matrix

C. null matrix

D. non-singular matrix

Answer:

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4. If $y = \sin t - \cos t$ and $x = \sin t + \cos t$, then $\frac{dy}{dx}$ at $t = \frac{\pi}{6}$ is :

A. 1

B. $2 + \sqrt{3}$

C. 0

D. $\frac{\sqrt{3}-1}{2}$

Answer:

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5. The interval in which the function $f(x) = 2x^3 - 9x^2 + 12x - 15$ is increasing, is :

A. (1,2)

B. $(-\infty, 1) \cup (2, \infty)$

C. $(-\infty, 1)$

D. $(2, \infty)$

Answer:

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6. The equation of tangent to the curve $16x^2 + 9y^2 = 145$ at the $(2, y_1)$, where $y_1 > 0$, is :

A. $32x + 27y - 145 = 0$

B. $27x - 32y + 144 = 0$

C. $9x - 7y + 145 = 0$

D. $7x + 9y - 144 = 0$

Answer:

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7. If $x = \cos\theta$ and $y = \sin^3\theta$, then $\left| \frac{yd^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 \right|$ at $\theta = \frac{\pi}{2}$ is:

A. $\sin 2\theta \sec\theta$

B. $3\cos 2\theta \quad \text{cosec}\theta$

C. $\sec^2\theta \sin\theta$

D. $3 \quad \text{cosec}^2\theta \cos\theta$

Answer:

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8. If the system of linear equations $x - y = 0, 2x + 3y + 4z = 17$ and $y + 2z = 7$ are written in matrix form as $PX = Q$, then the value of $|P|$ is :

A. 6

B. 8

C. 14

D. 20

Answer:

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9. Simplify:

$$\cos\theta\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}+\sin\theta\begin{bmatrix}\sin\theta & -\cos\theta\\ \cos\theta & \sin\theta\end{bmatrix}$$

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

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

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

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

Answer:

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10. The value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)+\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$ is

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

B. $\frac{7\pi}{6}$

C. $\frac{11\pi}{6}$

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

Answer:

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11. Let the relation R is a set of real numbers be defined as $R = \{(x, y), y = 3x + 5\}$, If (a,2) and $(4, 6b)$ belongs to R, the respective values of a,b are :

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12. Tangents to the curve $y = x^3 + 3x$ at $x = 1$ and $x = -1$ are :

A. parallel

B. intersecting at acute angle

C. intersecting at right angle

D. intersecting at an angle of 45°

Answer:

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13. If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, then $\frac{dy}{dx} =$

A. $\frac{x-1}{2x^{3/2}}$

B. $\frac{x+2}{x^{1/2}}$

C. $\frac{4x-1}{\sqrt{x}}$

D. $\frac{9x-4}{x^{3/2}}$

Answer:

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14. The adjoint of matrix $\begin{bmatrix} 3 & 2 \\ -1 & 4 \end{bmatrix}$ is :

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

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

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

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

Answer:

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15. The corner points of a feasible region determined by a system of linear inequalities are (20,40),(50,100),(0,200) and (0,50). If the objective

funtion $Z = x + 2y$, then maximum of Z occurs at.

A. (20,40)

B. -50100

C. (0,200)

D. (0,50)

Answer:

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16. From the matrix equation AB=AC, we conclude B=C provided.

A. A is a symmetric matrix

B. A is a singular matrix

C. A is a skew - symmetric matrix

D. A is a non-singular matrix

Answer: D

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17. The derivation of $\sqrt{\frac{1-\cos x}{1+\cos x}}$ w.r.t. x is

A. $\sec^2\frac{x}{2}$

B. $\frac{1}{2}\sec^2\frac{x}{2}$

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

D. $\sec^2\frac{x}{2}$

Answer:

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18. Determine the intervals in which the following functions are strictly increasing or strictly decreasing :

$$f(x) = \frac{3}{10}x^4 - \frac{4}{5}x^3 - 3x^2 + \frac{36}{5}x + 11$$

A. increasing in $(\infty, -2) \cap (1, 3)$ and decreasing in $(-2, 1) \cup (3, \infty)$

B. increasing in $(-2, 1) \cap (3, \infty)$ and decreasing in $(-\infty, -2) \cap (3, \infty)$ and decreasing in $(-\infty, -2) \cap (1, 3)$

C. increasing in $(-2, 1) \cup (3, \infty)$ and decreasing in $(\infty, -2) \cup (1, 3)$

D. increasing in $(-\infty, -2) \cup (1, 3)$ and decreasing in $(-2, 1) \cap (3, \infty)$

Answer: B

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Section C

1. Let $A = \{1, 2, 3\}, B = \{5, 6, 7\}$ and $f: A \to B$ be a function defined as $f = \{(1, 6), (2, 5), (3, 7)\}$ Then f is :

A. one -one but not onto

B. onto but not one-one

C. both one - one onto

D. neither one - one nor onto

Answer:

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2. Tangent to the curve $x^2 = 2y$ at the point $\left(1, \frac{1}{2}\right)$ makes with the X-axes an angle of

A. 0

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

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

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

Answer: B

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3. If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and I is an identity matrix of order 2, then the value of k, if $A^2 = 8A + kI$, is :

A. -7

B. -3

C. 4

D. 6

Answer:

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4. If A is a matrix of order 3×3 and $|A| = 4$ then the value of |adj A| os :

A. 4

B. 16

C. 64

D. 12

Answer:

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