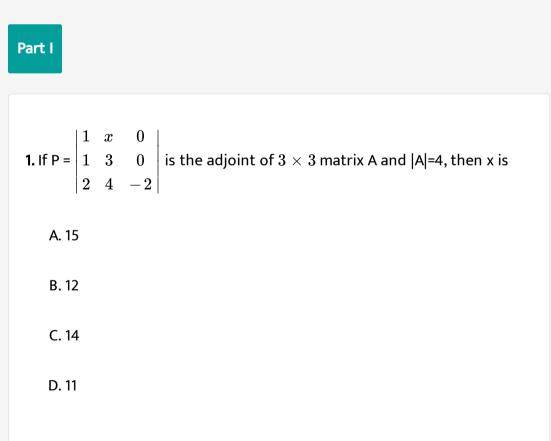




MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER - 16



Answer:

2. If P =
$$\begin{vmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{vmatrix}$$
 is the adjoint of 3×3 matrix A and |A|=4, then x is

A. consistent and has infinitely many solution

B. consistent and has a unique solution

C. consistent

D. inconsistent

Answer:

3. The principal argument of
$$\frac{3}{-1+i}$$
 is

$$A. -\frac{5\pi}{6}$$
$$B. \frac{-2\pi}{3}$$

C.
$$\frac{-3\pi}{4}$$

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



4. If
$$z = \frac{\left(\sqrt{3} + i\right)^3 (3i + 4)^2}{(8 + 6i)^2}$$
, then |z| is equal to
A. 0
B. 1
C. 2
D. 3

Answer:

5. If find g are polynomials of derrees m and n respectively, and if h(x) = $(f^{\circ}g)(x)$, then the degree of h is

A. mn

B. m + n

 $\mathsf{C}.\,m^n$

 $\mathsf{D.}\, n^m$

Answer:

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6. The equation
$$an^{-1}x - \cot^{-1}x = an^{-1} igg(rac{1}{\sqrt{3}} igg)$$
 has

A. no solution

B. unique solution

C. two solutions

D. infinite number of solutions



7.
$$\sin^{-1}\left(3\frac{x}{2}\right) + \cos^{-1}\left(3\frac{x}{2}\right) = \dots$$

A. $\frac{3\pi}{2}$
B. 6 x
C. 3 x

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

Answer:

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8. Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4}$ parallel to the straight line 2x - y= 1. One of the points of contact of tangents on the hyperbola is

A.
$$\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$$

B. $\left(\frac{-9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$
C. $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$
D. $\left(3\sqrt{3}, -2\sqrt{2}\right)$



9. The vertices of the ellipse $16x^2+25y^2=400$ are

- A. (\pm 3, 0)
- B. $(0, \pm 3)$
- $C.(0, \pm 5)$
- D. (\pm 5, 0)

Answer:

10. If the volume of the parallelpiped with $\overrightarrow{a} \times \overrightarrow{b}, \overrightarrow{b} \times \overrightarrow{c}, \overrightarrow{c} \times \overrightarrow{c} \times \overrightarrow{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $\left(\overrightarrow{a} \times \overrightarrow{b}\right) \times \left(\overrightarrow{b} \times \overrightarrow{c}\right), \left(\overrightarrow{b} \times \overrightarrow{c}\right) \times \left(\overrightarrow{c} \times \overrightarrow{a}\right)$ and $\left(\overrightarrow{c} \times \overrightarrow{a}\right) \times \left(\overrightarrow{a} \times \overrightarrow{a}\right) \times \left(\overrightarrow{a} \times \overrightarrow{a}\right) \times \left(\overrightarrow{a} \times \overrightarrow{a}\right)$

as coterminous edges is,

A. 8 cubic units

B. 512 cubic units

C. 64 cubic units

D. 24 cubic units

Answer:



$$\overrightarrow{d} = \overrightarrow{a} imes \left(\overrightarrow{b} imes \overrightarrow{c}
ight) + \overrightarrow{b} imes \left(\overrightarrow{c} imes \overrightarrow{a}
ight) + \overrightarrow{c} imes \left(\overrightarrow{a} imes \overrightarrow{b}
ight), ext{ then }$$

A. \overrightarrow{u} is a unit vector

$$\mathsf{B}.\,\overrightarrow{u} = \overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c}$$

$$\mathsf{C}.\,\overrightarrow{u}\,=\,\overrightarrow{0}$$

$$\mathsf{D}.\,\overrightarrow{u}\,\neq\,\overrightarrow{0}$$

Answer:



12. The maximum value of the functions $x^2e^{-2x}, x>0$ is

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

B. $\frac{1}{2e}$
C. $\frac{1}{e^2}$

D.
$$\frac{4}{e^4}$$



13. If
$$u(x, y) = x^2 + 3xy + y - 2019$$
, then $\left(\frac{\partial u}{\partial x}\right)_{4 -5}^{-5}$ is equal to
A. -4
B. -3
C. -7
D. 13

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14. The differential on y of the function $y=x^{rac{1}{4}}$ is

A.
$$\frac{1}{4}x^{\frac{3}{4}}$$

B. $\frac{1}{4}x^{-\frac{3}{4}}dx$
C. $x^{\frac{3}{4}}dx$ `
D. O

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15. The curve
$$a^2y^2=x^2ig(a^2-x^2ig)$$
 is symmetrical about

A. x - axis only

B. y-axis only

C. both the axix

D. both the axis and origin

Answer:

16. The value of
$$\int_0^1 \left(\sin^{-1}x
ight)^2 dx$$
 is

A.
$$\frac{\pi^2}{4} - 1$$

B. $\frac{\pi^2}{4} + 2$
C. $\frac{\pi^2}{4} + 1$
D. $\frac{\pi^2}{4} - 2$



17. The integrating factor of the differential equation $rac{dy}{dx} + P(x)y = Q(x)$ is x, then P(x)

A. x

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

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



18. The number of arbitrary constants in the general solutions of order n and n+1 are respectively

A. n - 1, nB. n, n + 1C. n + 1, n + 2D. n + 1, n

Answer:

19. Four buses carrying 160 students from the same school arrive at a football stadium. The buses carry, respectively, 42, 36, 34, and 48 students. One of the students is randomly selected. Let X denote the number of students that were on the bus carrying the randomly selected student. Let Y denote the number of students on that bus. Then E[X] and E[Y] respectively are

A. 50,40

B.40,50

C. 40.75, 40

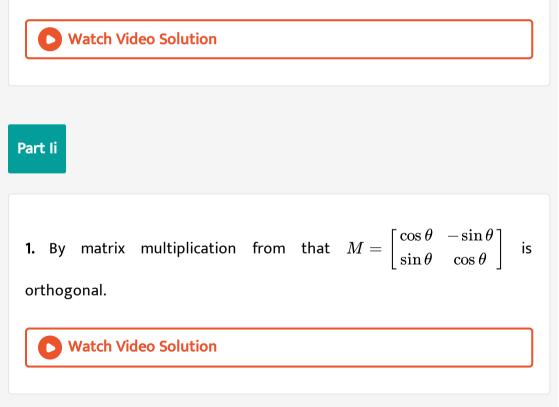
D. 41, 41

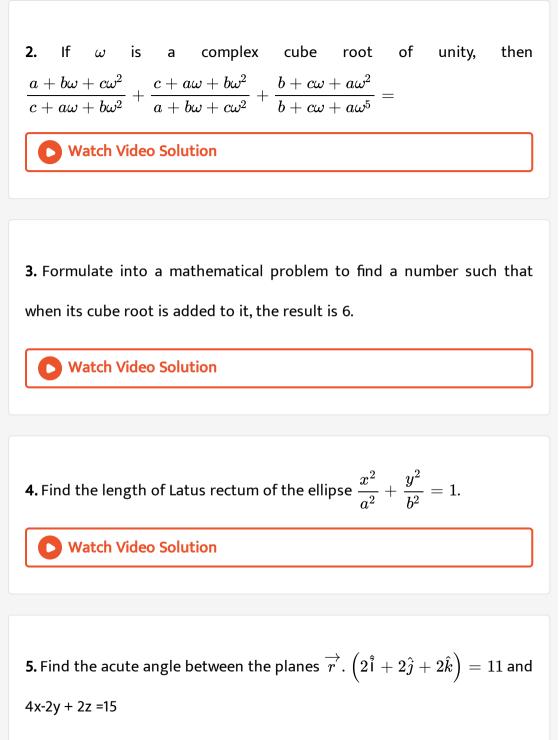
Answer:

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20. Which one is the inverse of the statement $(p \lor q)
ightarrow (p \land q)$?

$$egin{aligned} \mathsf{A}.\ (p\wedge q) &
ightarrow (p\vee q) \ & \mathsf{B}.-(p\vee q) &
ightarrow (p\wedge q) \ & \mathsf{C}.\ (-p\vee -q) &
ightarrow (-p\wedge -q) \ & \mathsf{D}.\ (-p\wedge -q) &
ightarrow (-p\vee -q) \end{aligned}$$





6. Obtain the Maclaurin's series expansion for the function e^{2x}

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7. Let us assume that the the shape of a soap bubble is a sphere . Use linear approximation to approximate the increase in the surface area of a soap bubble as its radius increases from 5 cm to 5.2 cm also calculate the percentage error.

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8. Evaluate the following :

 $\int_{0}^{\frac{n}{2}}\sin^{3}\theta\cos^{5}\theta d\theta$

9. Show what $y = a e^{-3x} + b,\,$ where a and b are arbitary constants, is a

solution of the differential equation
$$rac{d^2y}{dx^2}+3rac{dy}{dx}=0$$

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10. Find the value of
$$\sec^{-1}\left(-\frac{2\sqrt{3}}{3}\right)$$

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Part lii

1. Find the inverse of the non-singular matrix A = $\begin{bmatrix} 0 & 5 \\ -1 & 6 \end{bmatrix}$, by Gauss

Jordan method.



2. The complex numbers u, v and w are related by $\frac{1}{u} = \frac{1}{v} + \frac{1}{w}$. If v = 3

-4i and w = 4 + 3i , find u in rectangular form.



3. If the root of $x^3 + px^2 + qx + r = 0$ are in H.P. prove that $9pqr = 27r^2 + 2q^3$. Assume p, q, r
eq 0

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4. Find the value of

$$\cot^{-1}(1) + \sin^{-1}\!\left(rac{-\sqrt{3}}{2}
ight) - \sec^{-1}\!\left(-\sqrt{2}
ight)$$

5. Find the absolute maximum and absolute minimum values of f on the given interval $f(x)=rac{x}{x+1}$ [1,2]

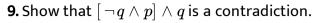
6. The time T, taken for a complete oscillation of a single pendulam with length I, is given by the equation $T = 2\pi \sqrt{\frac{l}{g}}$, where g is a constant. Find the approximate percentage error in the calculated value of T corresponding to an error of 2 percent in the value of I.

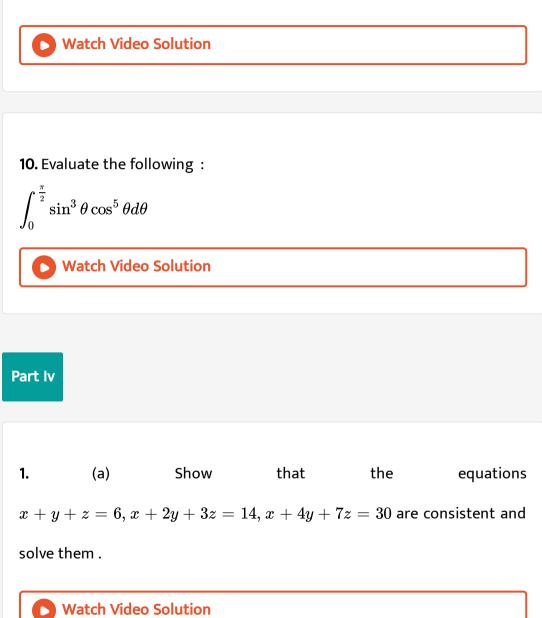
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7. Solve
$$e^x\sqrt{1-y^2}dx+rac{y}{x}dy=0$$

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8. An urn contains 5 mangoes and 4 apples. Three fruits are taken at random. If the number of apples taken is a random variable, then find the values of the random variable and number of points in its inverse images.





2. Verify (i) closure property (ii) commutative property (iii) associate property (iv) existence of identity and (v) existence of inverse for the opertion \times 11 on a subset A = {1,3,4,5,9} of the set of the remainders {0,1,2,3,4,5,6,7,8,9,10}.



3. Prove that
$$(1+i)^n + (1-i)^n = 2^{rac{n+2}{2}} rac{\cos(n\pi)}{4}$$

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4. Find the parametric form of vector equation, and Cartesian equations of the plane passing through the points (2, 2, 1), (9, 3, 6) and perpendicular to the plane 2x + 6y + 6z = 9.

5. Find a polynomial equation of minimum degree with rational coefficients, having $\sqrt{5} - \sqrt{3}$ as a root.



6. If the probability mass function f(x) of a random variable X is

x	1	2	3	4
<i>f</i> (<i>x</i>)	1	5	5	1
	12	12	12	12

find (i) its cumulative distribution hence find (ii) P (X \leq 3) and , (iii) $P(X \geq 2)$

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7. Prove that
$$: \cosig[an^{-1}ig\{\sinig(an^{-1}\,xig)ig\}ig] = \sqrt{rac{x^2+1}{x^2+2}}$$

8.
$$ig(x^2+y^2ig) dy=xydx.$$
 It is given that $y(1)=1$ and $y(x_0)=e.$ Find the

vale of x_0 .



9. At a water fountain , water attains a maximum height of 4m at horizontal distance of 0.5 m from its origin. If the path of water is a parabola, find the height of water at a horizontal distance of 0.75 m from the point or origin.

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10. Prove that the curves $y^2 = 4x$ and $x^2 = 4y$ divide the area of the square bounded by x = 0, x = 4 and y = 0 into three equal parts.

11. If
$$\overrightarrow{a} = 2\overrightarrow{i} + 3\overrightarrow{j} - \overrightarrow{k}$$
, $\overrightarrow{b} = 2\overrightarrow{i} + 5\overrightarrow{k}$, $\overrightarrow{c} = \overrightarrow{j} - 3\overrightarrow{k}$, verify that
 $\overrightarrow{a} \times \left(\overrightarrow{b} \times \overrightarrow{c}\right) = \left(\overrightarrow{a} \cdot \overrightarrow{c}\right)\overrightarrow{b} - \left(\overrightarrow{a} \cdot \overrightarrow{b}\right)\overrightarrow{c}$.

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12. Prove that the line 5x+12y=9 touches the hyperbola $x^2-9y^2=9$

and find the point of contact.

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13. Prove that the ellipse $x^2+4y^2=8$ and the hyperbola $x^2-2y^2=4$

intersect orthogonally.

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14. Let W(x,y,z) $=x^2-xy+3\sin z, x, y, z\in R$, Find the linear approximation at (2,-1,0).



