



MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER - 5



1. If
$$A = \begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$$
 and $B = \begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then $|adj(AB)|=$

A. - 40

B. - 80

C. - 60

D. - 20

Answer: B

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2. $i^n + i^{n+1} + i^{n+2} + i^{n+3}$

A. 0

B. 1

 $\mathsf{C}.-1$

D. i

Answer: A

3. If
$$\omega = cis \frac{2\pi}{3}$$
, then number of distinct roots
of $\begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix} = 0.$

A. 1

B. 2

C. 3

D. 4

Answer: A

4.
$$\sin^{-1}(\cos x) = rac{\pi}{2} - x$$
 is valid for

A.
$$-\pi \leq x \leq 0$$

 $\texttt{B.0} \leq x \leq \pi$

C.
$$-rac{\pi}{2} \leq x \leq rac{\pi}{2}$$

D. $-rac{\pi}{4} \leq x \leq rac{3\pi}{4}$

Answer: B

5.
$$\tan^{-1} x + \cot^{-1} x = \dots$$

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

D. π

Answer: C

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6. The equation of the normal to the circle

 $x^2+y^2-2x-2y+1=0$ which is parallel

to the lines 2x + 4y = 3 is

A.
$$x+2y=3$$

B. x + 2y + 3 = 3

C.
$$2x+4y+3=0$$

D. x - 2y + 3 = 0

Answer: A

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7. The axis of the parabola $x^2=20y$ is

A.
$$y = 5$$

B. x = 5

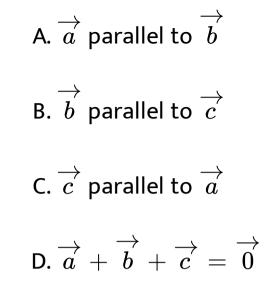
C. x = 0

D. y = 0

Answer: C

8. if
$$(\overrightarrow{a} \times \overrightarrow{b}) \times \overrightarrow{c} = \overrightarrow{a} \times (\overrightarrow{b} \times \overrightarrow{c})$$

where $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$ are any three vectors such
that $\overrightarrow{b}, \overrightarrow{c} \neq 0$ and $\overrightarrow{a}, \overrightarrow{b} \neq 0$ then \overrightarrow{a} and
 \overrightarrow{c} are_____



Answer: C



9. The vector equation of a plane whose distance from the origin is p and perpendicular to a unit vector \hat{n} is

A.
$$\overrightarrow{r}$$
. $\overrightarrow{n}=p$
B. \overrightarrow{r} . $\widehat{n}=q$
C. $\overrightarrow{r} imes\overrightarrow{n}=p$
D. \overrightarrow{r} . $\widehat{n}=p$

Answer: D

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10. The point of inflection of the curve $y=(x-1)^3$ is

A. (0,0)

B. (0,1)

C. (1,0)

D. (1,1)

Answer: C

11. The curve
$$y^2(x-2)=x^2(1+x)$$
 has

A.
$$x = 1$$

$\mathsf{B.}\, y=1$

$$C. y = -1$$

D. x = -1

Answer: D

12. The solution of the equation
$$\frac{dx}{dy} + Px = Q$$
 where P and Q are function of y is :

$$\begin{array}{l} \mathsf{A.} y(I.\ F) = \int (I.\ F) Q dx + c \\ \mathsf{B.} y(I.\ F) = \int (I.\ F) Q dy + c \\ \mathsf{C.} y(I.\ F) = \int (I.\ F) Q dy + c \\ \mathsf{D.} x(I.\ F) = \int (I.\ F) Q dx + c \end{array}$$

Answer: B

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13. A circular template has a radius of 10 cm. The measurnment of the radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this

template is

A. 0.2~%

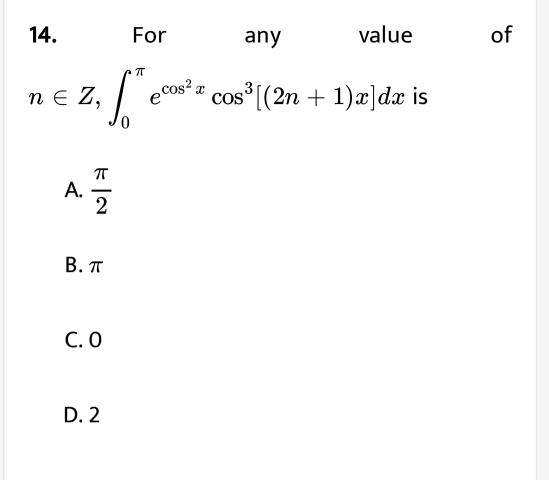
 $\mathsf{B.}\,0.4\,\%$

 $\mathsf{C}.\,0.04\,\%$

D. 0.08~%

Answer: B





Answer:

15. If n is odd then $\int_0^{\pi/2} \sin^n x dx$ is

A.
$$\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \cdots \frac{\pi}{2}$$

B. $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \cdots \frac{\pi}{2}$
C. $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \cdots \frac{3}{2} \cdot 1$
D. $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \cdots \frac{2}{3} \cdot 1$

Answer: D

16. The solution of
$$\frac{dy}{dx} = 2^{y-x}$$
 is

A.
$$2^x+2^y=c$$

B.
$$2^x-2^y=c$$

C. $rac{1}{2^x}-rac{1}{2^y}=c$

$$\mathsf{D}.\, x+y=c$$

Answer: C



17. If p and q are the oder and degree of the differential equation

$$yrac{dy}{dx}+x^3igg(rac{d^2y}{dx^2}igg)+xy=\cos x,\,\,$$
 when

- A. p < q
- $\mathsf{B.}\, p = q$
- $\mathsf{C}.\, p > q$
- D. p exists and q does not exist .

Answer: C



18. A pair of dice numbered 1, 2, 3, 4, 5, 6 of a six-sided die and 1, 2, 3, 4 of a four-sided die is rolled and the sum is determined. Let the random variable X denote this sum. Then the number of elements in the inverse image of 7 is

A. 1

B. 2

C. 3

D. 4

Answer: D



19. If in 6 trials, X is a binomial variate which follows the relation 9P(X=4)=P(X=2), then the probability of success is

A. 0.125

 $\mathsf{B}.\,0.25$

C.0.375

D.0.75

Answer: B



20. Which one of the following statements has truth value F?

A. Chennai is in India or $\sqrt{2}$ is an integer

B. Chennai is in India or $\sqrt{2}$ is an irrational

number

C. Chennai is in China or $\sqrt{2}$ is an integer

D. Chennai is in China or $\sqrt{2}$ is an irrational

number

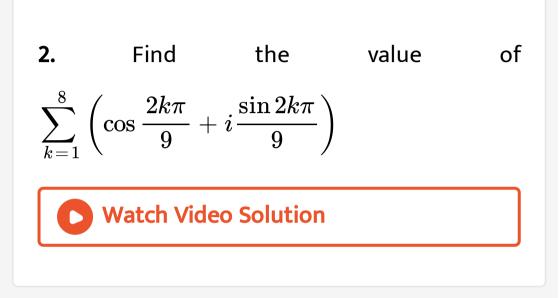
Answer: C



Part li

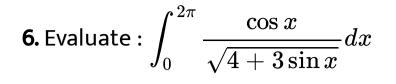
1. If A=
$$\begin{bmatrix} 8 & -4 \\ -5 & 3 \end{bmatrix}$$
, verify that A(adj A)= (adj A)
A= $|A|I_2$.





3. Solve the eqation
$$:x^4 - 14x^2 + 45 = 0$$

4. Find the principle value of $\sin^{-1}\left(-\frac{1}{2}\right)$ (in radians and degrees) Watch Video Solution 5. Show that the points (2, 3, 4), (-1, 4, 5) and (8, 1, 2)are collinear. Watch Video Solution



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7. Find the order and degree of the differential

equation
$$\displaystyle rac{d^2y}{dx^2} - y + \left(rac{dy}{dx} + rac{d^3y}{dx^3}
ight)^{rac{3}{2}} = 0$$

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8. Suppose the amount of milk sold daily at a milk booth is distributed with a minimum of

200 litres and a maximum of 600 litres with

probability density function

$$f(x) = egin{cases} k & 200 \leq x \leq 600 \ 0 & ext{otherwise} \end{cases}$$

Find

the probability that daily sales will fall between 300 litres and 500 litres?

9.
 Let

$$A = \begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \end{pmatrix}$$
 $B = \begin{pmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{pmatrix}$

$$C = \begin{pmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{pmatrix}$$
 by any three boolean

matrices of the same type. Find (i) $A \lor B$, (ii)

 $A \wedge B$, (iii) $(A \lor A) \wedge C$, (iv) $(A \land B) \lor C$.

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10. Find the general equation of a circle with

centre (-3,-4) and radius 3 units.



1. If
$$A = \frac{1}{9} \begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$$
 prove that $A^{-1} = A^{T}$.

2. If $z_1 = 2 + 5i, z_2 = -3 - 4i$, and $z_3 = 1$

+ I, find the additive and multiplicative inverse

of z_1, z_2 and z_3 .

3. Solve the equation $3x^3 - 26x^2 + 52x - 24 = 0$ if its roots form a

geometric progression.



4. Find the value of

$$\cot^{-1}\left(\sin^{-1}\frac{3}{5} + \sin^{-1}\frac{4}{5}\right)$$

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5. if the normal at the point t_1 on the parabola $y^2=4ax\,$ meets the parabola again in the point t_2 then prove that $t_2=-\left(t_1+rac{2}{t_1}
ight)$

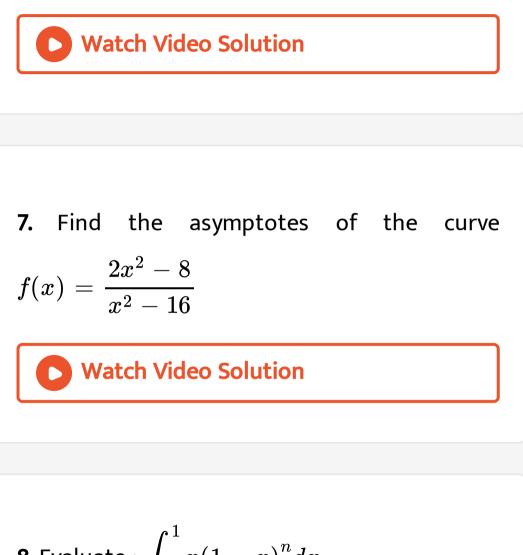
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6. Find the coordinates of the foot of the perpendicular drawn from the point (-1,2,3) to

the straight line
$$ec{r} = \left(ec{i} - 4\hat{j} + 3\hat{k}
ight) + t \Big(2\hat{i} + 3\hat{j} + \hat{k}\Big)$$
 .

Also , find the shortest distance from the given

point to the straight line.

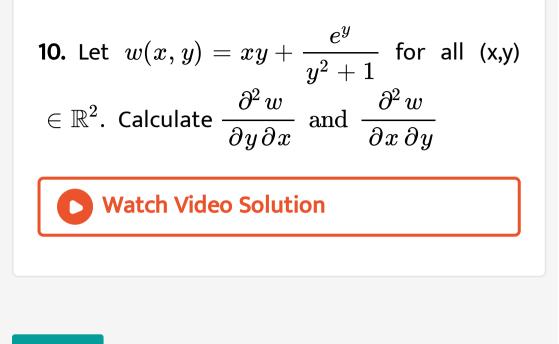


8. Evaluate :
$$\int_0^{\infty} x(1-x)^n dx$$

9. For the distribution function given by $F(x) = egin{cases} 0, & x < 0 \ x^2, & 0 \le x \le 1 \,.$ Find the density $1, & x > 1 \end{pmatrix}$

function.

Also evaluate (i) P(0.5 < x < 0.75) (ii) $P(x \le 0.5)$ (iii) P(X > 0.75)



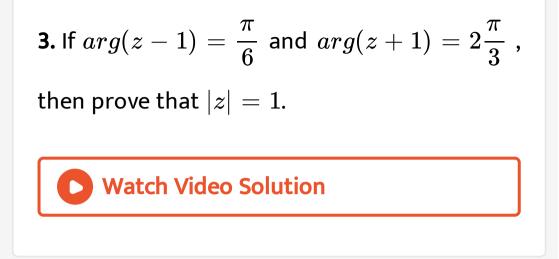
Part Iv

1. An amount of Rs 65,000 is invested in three bonds at the rates of 6 % , 8% and 10% per annum respectively. The total annual income is Rs 4,800. The income from the third bond is Rs 600 more than that from the second bond. Determine the price of each bond. (Use Gaussian elimination method.)



2. Find the equation of the curve whose slope

is $\frac{y-1}{x^2+x}$ and which passes through the point (1,0).



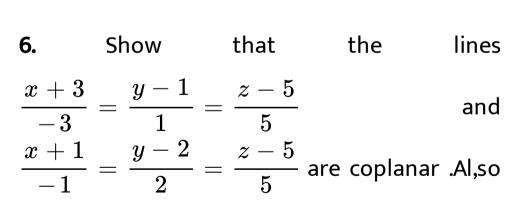
4. Integrate the function

$$\frac{3x^2}{x^6+1}$$

5. Solve the equation $x^3 - 9x^2 + 14x + 24 = 0$ if it is given that two of its roots are in the ratio 3:2.

two of its roots are in the ratio 3:2.

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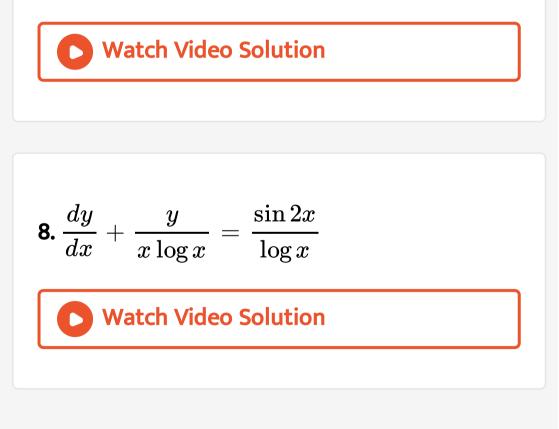


find the equation of the plane containing these two lines.





7. Find the area of the region bounded by the parabola $y^2=x$ and the line y=x-2



9.
$$\cos\left(\sin^{-1}\left(rac{x}{\sqrt{1+x^2}}
ight)
ight)$$
 is :

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10. Find the mean of a random variable X,
whose probability density function is
$$f(x) = \begin{cases} \lambda e^{-\lambda x} & ext{for } x \geq 0 \\ 0 & ext{otherwise} \end{cases}$$
.

11. Show that the equation of the normal to the curve $x = a \cos^3 \theta$, $y = a \sin^3 \theta$ at 'heta' is $x \cos \theta - y \sin \theta = a \cos 2\theta$.



12. Verify (i) closure property (ii) commutative property (iii) associative property (iv) existence of identity and (v) existence of inverse for the operation $+_5$ on \mathbb{Z}_5 using table corresponding to addition modulo 5.



13. Prove that $g(x, y) = x \log\left(\frac{y}{x}\right)$ is homogenous, what is the degree? Verify Euler's Theorem for g.