



#### MATHS

## BOOKS - SURA MATHS (TAMIL ENGLISH)

## SURAS MODAL QUESTION PAPER-1 MATHEMATICS



**1.** If A = { (x,y) :  $y = sin x, x \in R$  } and B = { (x,y) :

 $y = \cos x, x \in R$  then  $A \cap B$  contains

A. no element

B. infinitely many elements

C. only one element

D. cannot be determined

Answer: infinitely many elements

2. The range of the function 
$$\frac{1}{1-2\sin x}$$
 is  
A.  $(\infty, -1) \cup \left(\frac{1}{3}, \infty\right)$   
B.  $\left(-1, \frac{1}{3}\right)$   
C.  $\left[-1, \frac{1}{3}\right]$   
D.  $(\infty, -1] \cup \left[\frac{1}{3}, \infty\right)$ 

Answer: 
$$(\,-\infty,\,-1]\cup\left[rac{1}{3},\infty
ight)$$

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3. The value of  $\log_{\sqrt{2}^{512}}$  is

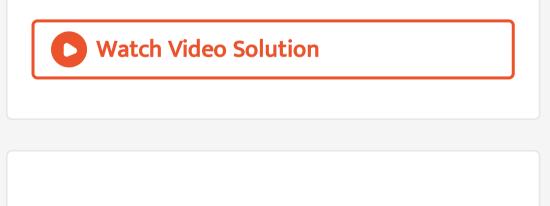
A. 16

B. 18

C. 9

D. 12

Answer: 18



4. The number of roots of $\left(x+3
ight)^4+\left(x+5
ight)^4=16\, ext{is}$ 

A. 4

B. 2

C. 3

D. 0

Answer: 2

# • Watch Video Solution 5. $\frac{1}{\cos 80^{\circ}} - \frac{\sqrt{3}}{\sin 80^{\circ}} =$

A.  $\sqrt{2}$ 

B.  $\sqrt{3}$ 

C. 2

D. 4

Answer: 4

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6. If sin  $\alpha + \cos \alpha$ = b, then sin 2 $\alpha$  is equal to

A. 
$$b^2-1, \hspace{1em} ext{if} \hspace{1em} b \leq \sqrt{2}$$

B.  $b^2 - 1$ , if  $> \sqrt{2}$ 

 $C. b^2 - 1, \text{ if } b \ge 1$ 

 $\mathsf{D}.\,b^2-1, \quad \text{if} \ \ b\geq \sqrt{2}$ 

#### Answer: $b^2 - 1$ , if $\leq \sqrt{2}$

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7. The number of 5 digit numbers all digits of

which are odd is

A. 25

 $C. 5^{6}$ 

 $D.\,625$ 

#### Answer: $5^5$



**8.** The number of permutations of n different things taking r at a time when 3 particular things are to be included is

A. 
$${}^{n-3}P_{r-3}$$

B. 
$$^{n-3}P_r$$

C. 
$${}^{n}P_{r-3}$$

D. 
$$r!^{n-3}C_{r-3}$$

Answer: 
$$r!^{n-3}C_{r-3}$$

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# 9. If ${}^{n}C_{10} > {}^{n}C_{r}$ for all possible r, then a value of n is

#### A. 10

B. 21

C. 19

D. 20

Answer: 20

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10. Choose the correct statement

A. Matrix addition is not associative

B. Matrix addition is not commutative

C. Matrix multiplication is associative

D. Matrix multiplication is commutative

#### Answer: Matrix multiplication is associative



#### 11. Find the odd one out of the following

A. 
$$\begin{bmatrix} 0 & 2 \\ -2 & 0 \end{bmatrix}$$
  
B. 
$$\begin{bmatrix} 0 & \frac{-7}{2} \\ \frac{7}{2} & 0 \end{bmatrix}$$
  
C. 
$$\begin{bmatrix} 0 & 3.2 \\ -3.2 & 0 \end{bmatrix}$$

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

Answer: (a),(b),(c) are skew symmetric and (d) symmetric (4)  $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ 

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#### 12. Match List-I with List II

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A. 
$$egin{array}{ccc} (i) & (ii) & (iii) & (iv) \ d & c & a & b \end{array}$$

 $\mathsf{B}.\,((i),\,(ii),\,(iii),\,(iv)),\,(d,\,c,\,b.\,\,a)$ 

C. 
$$\binom{(i)}{b}$$
  $\binom{(ii)}{a}$   $\binom{(iii)}{c}$   $\binom{(iv)}{a}$   
D.  $\binom{(i)}{b}$   $\binom{(ii)}{c}$   $\binom{(iii)}{a}$   $\binom{(iv)}{d}$ 

#### Answer: i-b ,ii-c,iii-a, iv-d

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13. Two vertices of a triangle have position vectors  $3\hat{i} + 4\hat{j} - 4\hat{k}$  and  $2\hat{i} + 3\hat{j} + 4\hat{k}$ . If the position vector of the centroid is  $\hat{i}+2\hat{j}+3\hat{k}$ , then the position vector of the

third vertex is

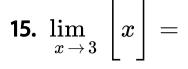
A. 
$$-2\hat{i}-\hat{j}+9\hat{k}$$
  
B.  $-2\hat{i}-\hat{j}-6\hat{k}$   
C.  $-2\hat{i}-\hat{j}+6\hat{k}$   
D.  $2\hat{i}-\hat{j}+6\hat{k}$ 

Answer:  $-2\hat{i}-\hat{j}+9\hat{k}$ 

14. Choose the incorrect pair :

- A.  $\sin x \quad x \in R$
- $\mathsf{B.}\cos x \qquad x \in R$
- $\mathsf{C}.\log x \quad x > 0$
- $\mathsf{D.}\, e^{-x} \quad x > 0$

Answer: Hint:  $e^{-x}$  can be defined in  $\mathbb{R}(4)e^{-x}; x>0$ 



#### A. 2

B. 3

- C. does not exist
- D. 0

#### Answer: does not exist



16. The function 
$$y=rac{|3x-4|}{3x-4}$$
 is

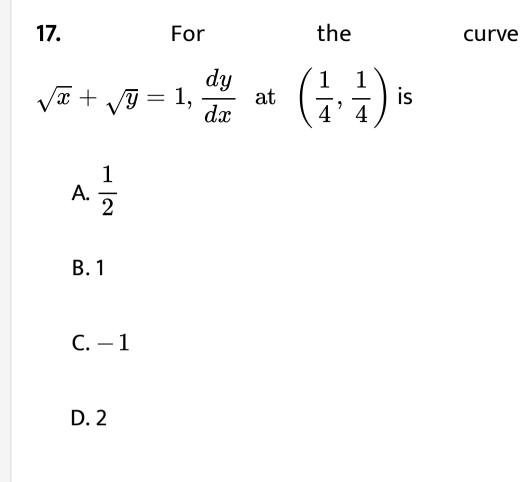
discontinuous at x =

A. 0

B.  $\frac{3}{4}$ C.  $\frac{4}{3}$ 

D. 1

Answer: 
$$\frac{4}{3}$$



#### Answer: -1

18. 
$$\int \frac{x+2}{\sqrt{x^2-1}} dx \text{ is}$$
A. 
$$\sqrt{x^2} - 1 - 2\log|x + \sqrt{x^2-1}| + c$$
B. 
$$\sin^{-1}x - 2\log|x + \sqrt{x^2-1}| + c$$
C. 
$$2\log|x + \sqrt{x^2-1}| - \sin^{-1}x + c$$
D. 
$$\sqrt{x^2-1} + 2\log|x + \sqrt{x^2-1}| + c$$
Answer: 
$$\sqrt{x^2-1} + 2\log|x + \sqrt{x^2-1}| + c$$
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**19.** Assertion (A) : In rolling die, getting number

Reason (R) : In a die contains only numbers 1,2,3,4,5,6

A. Both (A) and (R) are true and (R) is the

correct explantion of (A)

B. Both (A) and (R) are the true but (R) is

not the correct explantion of (A)

C. (A) is true (R) is false

D. (A) is false (R) is true

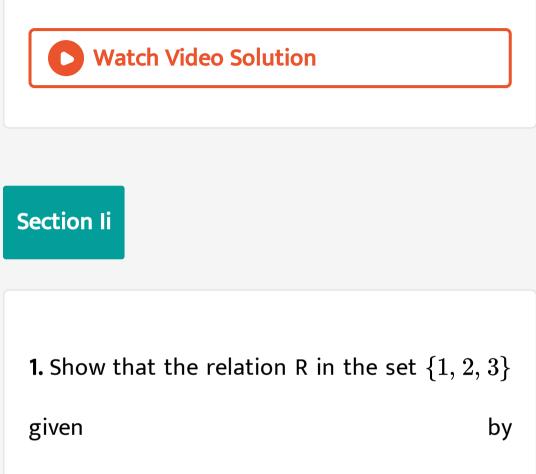
Answer: (a) is false (R) is true



**20.** If A and B are two events such that  $A \subset B$ and  $P(B) \neq 0$ , then which of the following is correct ?

A. 
$$P(A/B) = rac{P(A)}{P(B)}$$
  
B.  $P(A/B) < P(A)$   
C.  $P(A/B) \ge P(A)$   
D.  $P(A/B) > P(B)$ 

Answer: 
$$P(A / B) \ge P(A)$$



 $R=\{(1,1),(2,2),(3,3),(1,2),(2,3)\}\qquad {\rm is}\qquad$ 

reflexive but neither symmetric nor transitive.

2. A model rocket is launched from the ground. The height 'h' reached by the rocket after t seconds from lift off is given by h(t) = - $5t^2 + 100t, 0 \le t \le 20$ . At what time the rocket is 495 feet above the ground?

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3. Find the values of

sin (  $-1110^{\,\circ}$  )

**4.** A Kabaddi coach has has 14 players ready to play . How many different teams of 7 players could the coach put on the court ?



#### 5. Find a negative value of m if the Co-effcient

of  $x^2$  in the expanion of  $\left(1+x
ight)^m, \left|x
ight| < 1$  is 6



6. Find the value or values of m for which m

$$\left( \hat{i} + \hat{j} + \hat{k} 
ight)$$
 ia a unit vector .

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7. Solve : 
$$\lim_{x o 2} rac{x^4 - 16}{x-2}$$

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8. Solve :  $y = \sin x + \cos x$ 

**9.** Integrate  $\sqrt[3]{x^4}$ 

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**10.** Five mangoes and 4 apples are in a box . If two fruits are chosen at random, find the probability that

one is a mango and the other is an apple.



**11.** Five mangoes and 4 apples are in a box . If two fruits are chosen at random, find the probability that

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**1.** A plumber can be paid according to the following schemes, In the first scheme he will be paid rupees 500 plus rupees 70 per hour,

and in the second scheme he will paid 120 rupees per hour. If he works x hours. Then for what value of x does the first scheme give better wages?



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2. If in two circles, arcs of same length subtend

angles  $60^{\,\circ}\,$  and  $75^{\,\circ}\,$  at the centre, find the

ratio of their radii?



**3.** Find the sum of all 4-digit numbers that can be formed using digits 1, 2, 3, 4, and 5 repetitions not allowed?

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4. If a,b,c are in A.P. b,c,d are in G.P,c,d,e are in

H. P. then show that a,c,e are in G. P.

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**5.** Find the equation of the locus of a point such that the sum of the squares of the distance from the points (3, 5), (1, -1) is equal to 20.

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**6.** Construct the matrix  $A = ig[a_{ij}ig]_{3 imes3}$  , where

 $a_{ij}i - j$ .

State whether A is symmetric or skewsymmetric.



7. Find the vectors of magnitude  $10\sqrt{3}$  that are perpendicular to the plane which contains  $\hat{i} + 2\hat{j} + \hat{k}$  and  $\hat{i} + 3\hat{j} + 4\hat{k}$ Watch Video Solution

8. If 
$$f(x)=rac{2x+3\sin x}{3x+2\sin x}, x
eq 0$$
 is

continuous at x = 0, then find f(0)

**9.** Find the derivatives from the left and from the right at x=1 (if they exist) of the following functions. Are the functions differentiable at

x=1?

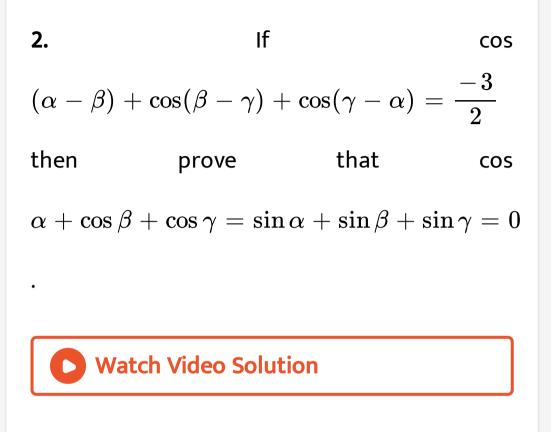
$$f(x)=\sqrt{1-x^2}$$

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10. If 
$$f^{\prime\prime}(x)=12x-6$$
 and  $f(1)=30$  ,  $f^{\prime}(1)=5 ext{ find } f(x)$ 

**1.** The formula for converting from Fahrenheit to Celsius temperatures is  $y = \frac{5x}{9} - \frac{160}{9}$ . Find the inverse of this function and determine whether the inverse is also a function.





#### 3. By the principle of mathematical induction ,

prove that for  $n \geq 1$ 

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4. By the principle of mathematical induction, prove that, for  $n \ge 1$  $1^3 + 2^3 + 3^3 + \ldots + n^3 = \left(\frac{n(n+1)}{2}\right)^2$ Watch Video Solution

5. Find the sum up to the  $17^{th}$  term of the series  $\frac{1^3}{1} + \frac{1^3 + 2^3}{1+3} + \frac{1^3 + 2^3 + 3^3}{1+3+5} + \dots$ Watch Video Solution **6.** A ray of light coming from the point (1,2) is reflected at a point A on the x-axis and it passes through the point (5,3). Find the co-ordinates of the point A.

C

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7. Solve 
$$\begin{vmatrix} 4-x & 4+x & 4+x \\ 4+x & 4-x & 4+x \\ 4+x & 4+x & 4-x \end{vmatrix} = 0$$

8. Show that the vectors are coplanar

$$\hat{i}-2\hat{j}+3\hat{k},\;-2\hat{i}+3\hat{j}-4\hat{k},\;-\hat{j}+2\hat{k}$$

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- **9.** Show that the following vectors are coplanar
- (ii)

 $5\hat{i}+6\hat{j}+7\hat{k},7\hat{i}-8\hat{j}+9\hat{k},\ -3\hat{i}+20\hat{j}+5\hat{k}$ 



#### 10. Examine the continuity of the following :

x + sinx



#### **11.** Examine the continuity of the following:

 $x^2 \cos x$ 

**12.** Examine the continuity of the following:

 $e^x \tan x$ 



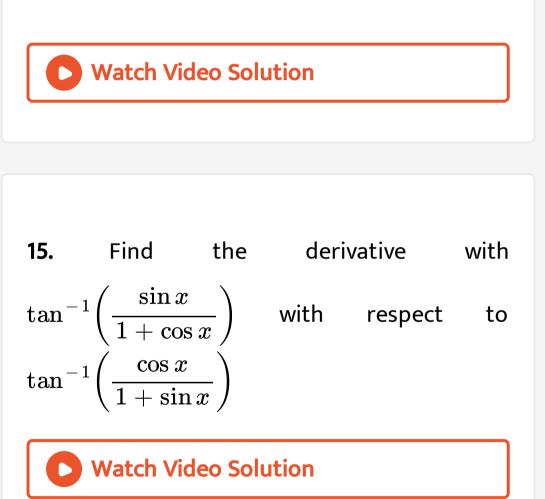
#### **13.** Examine the continuity of the following:

$$e^{2x} + x^2$$



**14.** Examine the continuity of the following:

 $x \cdot \ln x$ 



16. 
$$\frac{1}{\sqrt{x+3}-\sqrt{x-4}}$$

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**17.** A firm manufactures PVC pipes in three plants viz, X,Y and Z. The daily production volumes from the three firms X,Y and Z are respectively 2000 units, 3000 units and 5000 units. It is known from the past experience that 3% of the output from plant X,4% form plant Y and 2% from plant Z are defective. A

pipe is selected at random from a days total production,

(i)find the probability that the selected pipe is

a defective one

(ii)if the selected pipe is a defective ,then what

is the probability that it was produced by plant Y?

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?



