



MATHS

BOOKS - SURA MATHS (TAMIL ENGLISH)

SETS RELATIONS AND FUNCTIONS



1. Write the in roster form.

{x $\in \mathbb{N}$: $x^2 < 121$ and x is a prime}.



2. Write the in roster form.

the set of all positive roots of the equation (x-1) (x+1) ($x^2 - 1$)=0.

3. Write the in roster form.

 $\{ {\sf x} \ \in \mathbb{N} \colon \! 4x + 9 < 52 \}.$



4. Write the in roster form.

$$\left\{x\!:\!rac{x-4}{x+2}=3,x\in\mathbb{R}-\{-2\}
ight\}$$

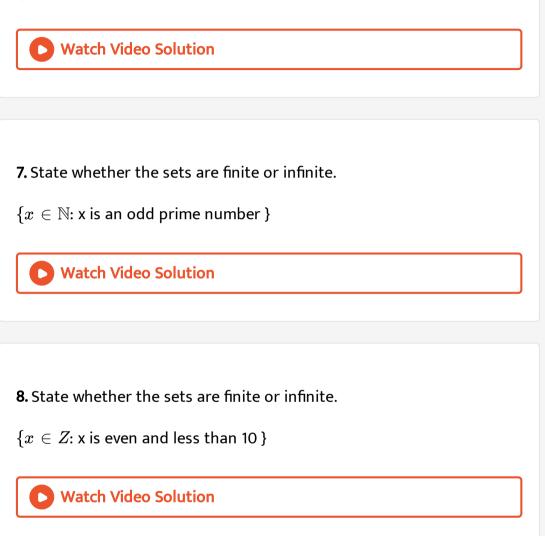
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5. Write the set {-1,1} in set builder form.



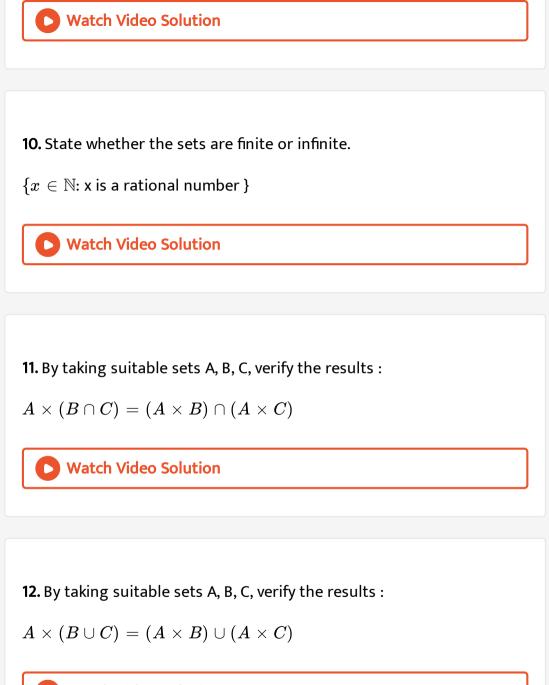
6. State whether the sets are finite or infinite.

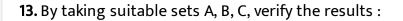
 $\{x\in\mathbb{N}:$ x is an even prime number $\}$



9. State whether the sets are finite or infinite.

 $\{x\in\mathbb{N}:$ x is a rational number }







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14. By taking suitable sets A, B, C, verify the results :

C-(B-A) = (C $\cap A$) \cup $(C \cap B)$

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15. By taking suitable sets A, B, C, verify the results :

(B-A) $\cap C = (B \cap C) - A = B \cap (C - A)$

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16. By taking suitable sets A, B, C, verify the results :

(B-A)
$$\cup C = (B \cup C) - (A - C)$$

17. Justify the trueness of the statement " An element of a set can never

be a subset of itself ".

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18. If n (p(A)) = 1024, n (A \cup B) = 15 and n (P (B)) = 32, then find n (A \cap

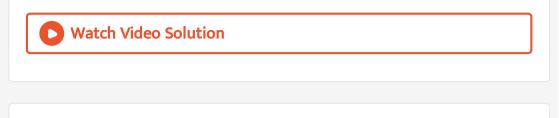
B).

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19. If $n(A \cap B) = 3$ and $n(A \cup B) = 10$ then find $n(P(A \triangle B))$

20. For a set A, A imes A contains 16 elements and two of its elements

are (1,3) and (0,2). Find the elements of A.



21. Let A and B be two sets such that n(A) = 3 and n(B) = 2. If (x,1) (y,2)

(z,1) are in A imes B, find A and B, where x,y,z are distinct elements.

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22. If A imes A has 16 elements, S = {(a,b) $\in A imes A : a < b$ }, (-1,2) and

(0,1) are two elements of S, then find the remaining elements of S.





1. Discuss the relations for reflexivity, symmetricity and transitivity :

The relation R defined on the set of all positive integers by " m Rn if m divides n".



2. Discuss the relations for reflexivity, symmetricity and transitivity :

Let P denote the set of all straight lines in a plane. The relation R defined by " IRm if I is perpendicular to m ".

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3. Discuss the relations for reflexivity, symmetricity and transitivity :

Let A be the set consisting of all the members of a family. The relation

R defined by " aRb if a is not a sister of b"

4. Discuss the relations for reflexivity, symmetricity and transitivity : Let A be the set consisting of all the female members of a family. The relation R defined by " aRb if a is not a sister of b".



5. Discuss the relations for reflexivity, symmetricity and transitivity :

On the set of natural numbers the relation R defined by " xRy if x + 2y =

1 ".

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6. Let $X = \{a, b, c, d\}$, and $R = \{ (a,a) (b,b) (a,c) \}$. Write down the minimum

number of ordered pairs to be included to R to make it

(i) reflexive (ii) symmetric

(iii) transitive (iv) equivalence.

7. Let $A = \{a,b,c\}$, and $R = \{(a,a) (b,b) (a,c)\}$. Write down the minimum

number of ordered pairs to be included to R to make it

(i) reflexive (ii) symmetric

(iii) transitive (iv) equivalence.

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8. Let P be the set of all triangles in a plane and R be the relation defined on P as a Rb if a is similar to b. Prove that R is an equivalence relation .

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9. On the set of natural number let R be the relation defined by aRb if 2a +3b=30. Write down the relation by listing all the pair . check whether it is

(i) reflexive (ii) symmetric (iii) transitive (iv) equivalence



10. Prove that the relation " friendship " is not an equivalence relation

on the set of all people in Chennai.

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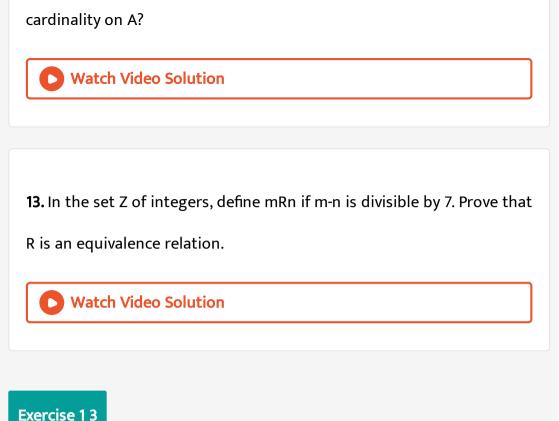
11. On the set of natural number let R be the relation defined by aRb if a+b \leq 6. Write down the relation by listing all the pairs. Check whether it is

(i) reflexive (ii) symmetric

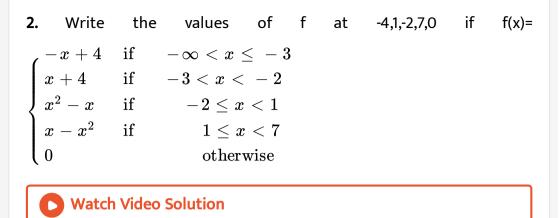
(iii) transitive (iv) equivalence.

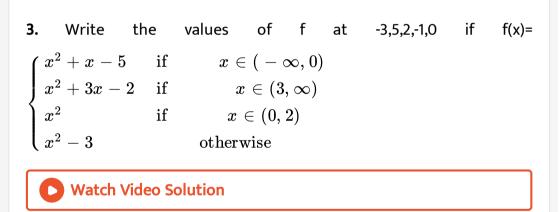


12. Let $A = \{a,b,c\}$. What is the equivalence relation of smallest cardinality on A ? What is the equivalence relation of largest



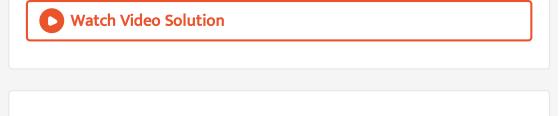
1. Suppose that 120 students are studying in 4 sections of eleventh standard in a school. Let A denotes the set of students and B denote the set of the sections. Define a relation from A to B as "x related to y if the student x belongs to the section y". Is this relation a function ? What can you say about the inverse relation ? Explain your answer.





4. State whether the following relations are functions or not. If it is a function check for one- to- oneness and ontoness. If it is not a function state why?

If A= {a,b,c} and f= {(a,c) (b,c) (c,b)}: (f:A
$$\rightarrow$$
 A).



5. State whether the following relations are functions or not. If it is a

function check for one- to- oneness and ontoness. If it is not a function

state why?

If X = { x,y,z } and f= {(x,y) (x,z) (z,x) } : (f: X \rightarrow X)

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6. Let A ={ 1,2,3,4,} and B = { a,b,c,d }. Give a function from A \rightarrow B for

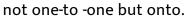
each of the :

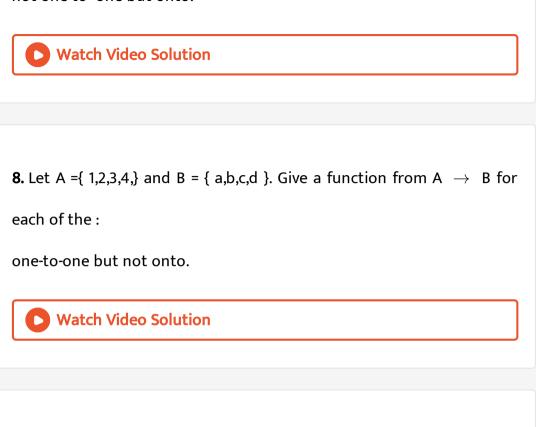
neither one -to -one and nor onto.



7. Let A ={ 1,2,3,4,} and B = { a,b,c,d }. Give a function from A \rightarrow B for

each of the :





9. Let A ={ 1,2,3,4,} and B = { a,b,c,d }. Give a function from A
$$\rightarrow$$
 B for

each of the :

one -to -one and onto.

10. Find the domain of
$$\frac{1}{1-2\sin x}$$

11. Find the largest possible domain of the real valued function f(x) =

$$\frac{\sqrt{4-x^2}}{\sqrt{x^2-9}}$$

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12. Find the range of the function
$$\frac{1}{2\cos x - 1}$$
.

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13. Show that the relation xy = -2 is a function for a suitable domain.

Find the domain and the range of the function.

14. If f,g : $\mathbb{R} \to \mathbb{R}$ are defined by f(x) = |x| + x and g(x) = |x|-x, find g o f

and f o g.



15. If f,g,h are real valued function defined on R, then prove that

(f+g)oh=foh+goh. what can you say about fo(g+h)? Justify your answer.

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16. If : $\mathbb{R} \to \mathbb{R}$ is defined by f(x) = 3x-5, prove that f is a bijection and find its inverse.



17. The weight of the muscles of a man is a function of his body weight

x and can be expressed as W(x) = 0.35x. Determine the domain of this

function.



18. The distance of an object falling is a function of time t and can be expressed as $s(t) = -16t^2$. Graph the function and determine if it is one-to-one.

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19. The total cost of airfare on a given route is comprised of the base cost C and the fuel surcharge S in rupee. Both C and S are functions of the mileage m, C(m) = 0.4 m + 50 and S(m) = 0.03 m. Determine a function for the total cost of a ticket in terms of the mileage and find the airfare for flying 1600 miles.



20. A salesperson whose annual earnings can be represented by the function A (x) = 30,000+0.04x, where x is the rupee value of the merchandise he sells. His son is also in sales and his earnings are represented by the function S(x) = 25,000 + 0.05 x. Find (A+S) (x) and determine the total family income if they each sell Rs 1,50,00,000 worth of merchandise.

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21. The function for exchanging American dollars for Singapore Dollar on a given day is f(x) = 1.23 x, where x represents the number of American dollars. On the same day the function for exchanging Singapore Dollar to Indian Rupee is g(y) = 50.50 y, where y represents the number of Singapore dollars. Write a function which will give the exchange rate of American dollars in terms of Indian rupee.

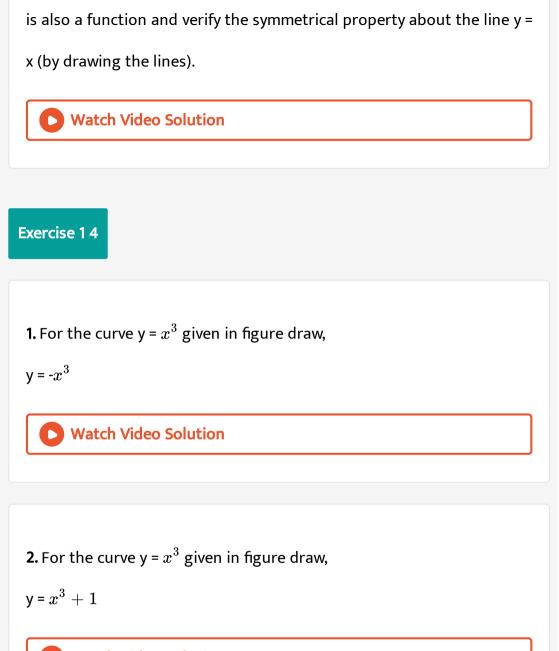
22. The owner of a small restaurant can prepare a particular meal at a cost of Rupees 100. He extimate that if the menu price of the meal is x rupees, then the number of customers who will order that meal at that price in an evening is given by the function D(x) = 200 - x. Express his day revenue total cost and profit on this meal as a function of x.

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23. 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.

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24. A simple ciphertakes a number and codes it, using the function f(x) = 3x - 4. Find the inverse of this function, determine whether the inverse



3. For the curve y = x^3 given in figure drawy= x^3-1



4. For the curve y = x^3 given in figure draw, y= $\left(x+1
ight)^3$

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5. For the curve ,
$$y = x^{rac{1}{3}}$$
 given in figure draw.

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6. For the curve , $y=x^{rac{1}{3}}$ given in figure draw.

$$y=x^{\left(rac{1}{3}
ight)}+1$$

7. For the curve , $y = x^{rac{1}{3}}$ given in figure draw.

$$y=x^{\left(rac{1}{3}
ight)}-1$$

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8. For the curve ,
$$y=x^{rac{1}{3}}$$
 given in figure draw. $(x+1)^{inom{1}{3}inom{1}{3}}$

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9. Graph the functions f (x) = x^3 and g(x) = $\sqrt[3]{x}$ on the same co-ordinate

plane. Find fog and graph it on the plane as well. Explain your results.

10. Write the steps to obtain graph of steps to obtain the graph of the

function y = 3 $(x - 1)^2$ +5 from the graph y = x^2 .



11. From the curve y=sin x, graph the functions.

y=sin (-x)

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12. From the curve y=sin x, graph the functions.

y= -sin (-x),



13. From the curve y=sin x, graph the functions.

y=sin
$$\left(rac{\pi}{2}+x
ight)$$
 which is cos x.

14. From the curve y=sin x, graph the functions.

y=
$$\sin\!\left(rac{\pi}{2}-x
ight)$$
 which is also cos x.

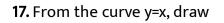
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y=-x



16. From the curve y=x, draw

y=2x



y=x+1



$$\mathsf{y}\text{=}\frac{1}{2}x+1$$

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19. From the curve y=x, draw

2x+y+3=0.



20. From the curve y= |x|, draw

y = |x-1|+1



21. From the curve y= |x|, draw

y= |x+1|-1

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y = |x+2|-3.



23. From the curve y = sin x draw y = sin |x| (Hint : sin (-x) = -sin x.)



1. If A= {(x,y) : y = $e^x, x \in R$ } and B = { (x,y) : y = $e^{-x}, x \in$ R} then n (A

$\,\cap\,$ B) is

A. Infinity

B. 0

C. 1

D. 2

Answer: A

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2. 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: A

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3. The relation R defined on a set A = { 0,-1,1,2} by xRy if $|x^2+y^2|~\leq 2$,

then which one of the following is true?

A. R= {(0,0),(0,-1),(0,1),(-1,0), (-1,1),(1,2),(1,0)}

B. $R^{-1} = \{(0,0), (0,-1), (0,1), (-1,0), (1,0)\}$

C. Domain of R is { 0,-1,1,2 }

D. Range of R is { 0,-1,1}

Answer: A

4. If $f(x) = |x-2| + |x+2|, x \in R$, then

$$egin{aligned} \mathsf{A}.\,f(x) &= egin{cases} -2x & ext{if} & x \in (-\infty,\,-2] \ 4 & ext{if} & x \in (-2,2] \ 2x & ext{if} & x \in (2,\infty) \ 2x & ext{if} & x \in (-\infty,\,-2] \ 4 & ext{if} & x \in (-2,2] \ -2x & ext{if} & x \in (2,\infty) \ -2x & ext{if} & x \in (2,\infty) \ \end{bmatrix} \ \mathsf{C}.\,f(x) &= egin{cases} -2x & ext{if} & x \in (-\infty,\,-2] \ -2x & ext{if} & x \in (-2,2] \ 2x & ext{if} & x \in (-\infty,\,-2] \ \end{bmatrix} \ \mathsf{D}.\,f(x) &= egin{cases} -2x & ext{if} & x \in (2,\infty) \ -2x & ext{if} & x \in (-\infty,\,-2] \ 2x & ext{if} & x \in (2,\infty) \ \end{array}$$

Answer: B::D

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5. Let \mathbb{R} be the set of all real numbers. Consider the following subsets of the plane $\mathbb{R} \times \mathbb{R}$:S = { (x,y) : y=x+1 and 0 < x < 2} and T = { (x,y) : x-y is an integer }. Then which of the following is true ? A. T is an equivalence relation but S is not an equivalence relation.

B. Neither S nor T is an equivalence relation

C. Both S and T are equivalence relation

D. S is an equivalence relation but T is not an equivalence relation.

Answer: A::B::C

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6. Let A and B be subsets of the universal set \mathbb{N} , the set of natural numbers. Then A' $\cup [(A \cap B) \cup B']$ is

A. A

B. A'

С. В

D. ℕ

Answer:



7. The number of students who take both the subjects Mathematics and Chemistry is 70. This represent 10 % of the enrollment in Mathematics and 14% of the enrollment in Chemistry. The number of students take at least one of these two subjects, is

A. 1120

B. 1130

C. 1100

D. insufficient data

Answer: A::C

8. If n $((A imes B) \cap (A imes C)) = 8 \mathrm{and} n (B \cup C) = 2$, then n (A) is

A. 6 B. 4 C. 8 D. 16

Answer: D

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9. If n (A) = 2 and n $(B \cup C)$ =3 then n $[(A imes B) \cup (A imes C)]$ is

A. 2³

 $\mathsf{B.}\,3^2$

C. 6

D. 5

Answer:



10. If two sets A and B have 17 elements in common, then the number of elements common to the set $A \times B$ and $B \times A$ is

 $\mathsf{A.}\,2^{17}$

 $\mathsf{B}.\,17^2$

C. 34

D. insufficient data

Answer: A::B



11. For non-empty sets A and B, if A $\ \subset B ext{then}(A imes B)\cap (B imes A)$ is equal to

A. $A\cap B$

 $\mathsf{B.}\,A\times A$

 $\mathrm{C}.\,B\times B$

D. none of these.

Answer: A

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12. The number of relations on a set containing 3 elements is

A. 9

B. 81

C. 512

D. 1024

Answer: C



13. Let R be the universal relation on a set X with more than one element. Then R is

A. not reflexive

B. not symmetric

C. transitive

D. none of these.

Answer: A

14. Let X = { 1,2,3,4 } and R = { (1,1), (1,2),(1,3),(2,2), (3,3),(2,1),(3,1),(1,4),(4,1) }.

Then R is

A. reflexive

B. symmetric

C. transitive

D. equivalence

Answer: C

15. The range of the function
$$rac{1}{1-2\sin x}$$
 is

$$\begin{array}{l} \mathsf{A}.\,(\,-\infty,\,\,-1)\cup\left(\displaystyle\frac{1}{3},\infty\right)\\\\ \mathsf{B}.\,\left(\,-1,\displaystyle\frac{1}{3}\right)\\\\ \mathsf{C}.\,\left[\,-1,\displaystyle\frac{1}{3}\right]\end{array}$$

$$\mathsf{D}.\,(\,-\infty,\,-1]\cup\left[rac{1}{3},\infty
ight)$$

Answer: A::C



16. The range of the function f(x) = $|\lfloor x
floor - x \mid , x \in \mathbb{R}$ is

A. [0,1]

 $\mathsf{B}.\left[0,\infty
ight)$

C. [0,1)

D. (0,1)

Answer: A



17. The rule $f(x) = x^2$ is a bijection if the domain and the co-domain are

given by

A. \mathbb{R}, \mathbb{R}

B. $\mathbb{R}, (0,\infty)$

 $\mathsf{C}.\,(0,\infty),\mathbb{R}$

D. $[0,\infty), [0,\infty)$

Answer:



18. The number of relations form a set containing melements to a set

containing n elements is

A. mn

B. m

C. n

D. m+n

Answer:

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19. The function f : [0,2 π] ightarrow 1 [-1,1] defined by f(x) = sin x is

A. one-to -one

B. onto

C. bijection

D. cannot be defined

Answer:

20. If the function f : [-3,3] \rightarrow S defined by f(x) = x^2 is onto, then S is

A. [-9,9]

 $\mathsf{B}.\,\mathbb{R}$

C. [-3,3]

D. [0,9]

Answer:

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21. Let X = { 1,2,3,4}, Y = {a,b,c,d} and f={(1,a), (4,b), (2,c),(3,d),(2,d)}. Then f

is

A. an one-to-one function

B. an onto function

C. a function which is not one-to-one

D. not a function

Answer: D



22. The inverse of f(x) =
$$\begin{cases} x & \text{if} \quad x < 1 \\ x^2 & \text{if} \quad 1 \le x \le 4 \text{is} \\ 8\sqrt{x} & \text{if} \quad x > 4 \end{cases}$$

A. $f^{-1}(x) = \begin{cases} x & \text{if} \quad x < 1 \\ \sqrt{x} & \text{if} \quad 1 \le x \le 16 \\ \frac{x^2}{64} & \text{if} \quad x > 16 \end{cases}$
B. $f^{-1}(x) = \begin{cases} -x & \text{if} \quad x > 16 \\ \sqrt{x} & \text{if} \quad 1 \le x \le 16 \\ \frac{x^2}{64} & \text{if} \quad x > 16 \end{cases}$
C. $f^{-1}(x) = \begin{cases} x^2 & \text{if} \quad x < 1 \\ \sqrt{x} & \text{if} \quad 1 \le x \le 16 \\ \frac{x^2}{64} & \text{if} \quad x > 16 \end{cases}$
D. $f^{-1}(x) = \begin{cases} 2x & \text{if} \quad x < 1 \\ \sqrt{x} & \text{if} \quad 1 \le x \le 16 \\ \frac{x^2}{8} & \text{if} \quad x > 16 \end{cases}$

Answer: A::B::D

23. Let $f: \mathbb{R} \to \mathbb{R}$ be defined by f(x)=1 - |x|. Then the range of f is

A. \mathbb{R}

 $\mathsf{B.}\left(1,\infty
ight)$

- $\mathsf{C.}\,(\,-1,\infty)$
- D. $(-\infty,1)$

Answer: D

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24. The function $f : \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = \sin x + \cos x$ is

A. an odd function

B. neither an odd function nor an even function

C. an even function

D. both odd function and even function.

Answer: A::C::D



25. The function
$$f : \mathbb{R} \to \mathbb{R}$$
 is defined by $f(x) = \frac{(x^2 + \cos x)(1 + x^4)}{(x - \sin x)(2x - x^3)} + e^{-|x|}$ is

A. an odd function

B. neither an odd function nor an even function

C. an even function

D. both odd function and even function.

Answer: A::C



Additional Problems Section A

1. Let $f: R \rightarrow R$ be defined as $f(x) = x^4$. Choose the correct answer.

A. f is one -one onto (2) f is onto

B.f is onto

C. f is one - one but not onto

D. f is neither one -one nor onto

Answer:

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2. Let f : R \rightarrow R to given by f(x) = $(3 - x^3)^{\frac{1}{3}}$. Then of (x) is

A. $x^{rac{1}{a}}$

 $\mathsf{B.}\, x^a$

C. x

 $\mathsf{D.}\,3-x^a$

Answer:



3. Let A = {-2,-1,0,1,2} and f:A \rightarrow Z be given by f(x) = $x^2 - 2x - 3$ then

preimage of 5 is

 $\mathsf{A.}-2$

B. - 1

C. 0

D. 1

Answer: B



4. Which one of the following is a finite set ?

A.
$$\{x\!:\!x\in\mathbb{Z},\,x<5\}$$

$$\mathsf{B.}\left\{x\!:\!x\in WW,x\geq 5\right\}$$

$$\mathsf{C}.\left\{x\!:\!x\in\mathbb{N},x>5\right\}$$

D. {x:x is an even prime number }

Answer: A::B



5. If \subseteq B, then A\B is

A. B

B. A

 $\mathsf{C}.\,\emptyset$

D. $\frac{B}{A}$

Answer:



6. Given A = {5,6,7,8}. Which one of the following is incorrect?

A. $\emptyset \subseteq A$

 $\mathsf{B}.\,A\subseteq A$

C. { 7,8,9} \subseteq A

 $\mathsf{D.}\left\{5\right\} \subseteq \mathsf{A}$

Answer: A::B

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7. The shaded region in the adjoining diagram represents.

A. A∖B

B. B∖A

 $\mathsf{C}.\,\mathsf{A}\Delta\mathsf{B}$

D. A'

Answer: A::B::D

D Watch Video Solution

8. The shaded region in the adjoining diagram represents.

A. A\B

B. A'

C. B'

D. B\A

Answer: A::B

9. Let R be a relation on the set \mathbb{N} given by `RR= {(a,b) : a=b-2,b gt6}. Then

A. (2,4) $\in R$

B. (3,8) $\in R$

 $\mathsf{C.}\,(6,8)\in~\mathsf{R}$

 $\mathsf{D.}\,(8,7)\in~\mathsf{R}$

Answer:

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10. If $A = \{1,2,3\}$, $B = \{1,4,6,9\}$ and R is a relation from A to B defined by "x

is greater than y ". The range of R is

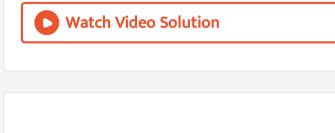
A. {1,4,6,9}

B. {4,6,9}

C. {1}

D. none of these.

Answer: A



11. For real numbers x and y define $x \mathrel{R} y$ if $x - y + \sqrt{2}$ is an irrational

number. Then the relation ${\cal R}$ is

A. reflexive

B. symmetric

C. transitive

D. none of these.

Answer:

12. Let R be the relation over the set of all straight lines in a plane such

that $l_1 R l_2 \Leftrightarrow l_1 \perp l_2$. Then R is

A. symmetric

B. reflexive

C. transitive

D. an equivalence relation

Answer: C



13. Which of the following is not an equivalence relation on z?

A. aRb $\Leftrightarrow a + b$ is an even integer

B. aRb <=> a-b is an even integer

 $\mathsf{C}.\, aRb \Leftrightarrow a < b$

 $\mathsf{D}.\,aRb \Leftrightarrow a = b$

Answer: A::B



14. Which of the following functions from z to itself are bijections (oneone and onto)?

A. $f(x) = x^3$ B. f(x)=x+2 C. f(x) = 2x+1

D. f(x) = $x^2 + x$

Answer: B

15. Let
$$f: Z \to Z$$
 be given by $f(x) = \begin{cases} \frac{x}{2} & \text{if is even} \\ 0 & \text{if is odd} \end{cases}$ Then f is

A. one-one but not onto

B. onto but not one -one

C. one-one and onto

D. neither one-one nor onto

Answer: B

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16. If f : R \rightarrow R is given by f(x) = 3x-5, then $f^{-1}(x)$ is

A.
$$rac{1}{3x-5}$$

B. $rac{x+5}{3}$

C. does not exist since f is not one-one

D. does not exists since f is not onto

Answer: C



17. If f (x) = 2x-3 and g(x)=
$$x^2 + x - 2$$
 then go f(x) is

A.
$$2ig(2x^2-5x+2ig)$$

B.
$$(2x^2 - 5x - 2)$$

C.
$$2(2x^2+5x+2)$$

D.
$$\left(2x^2+5x-2
ight)$$

Answer: B

18. Let
$$\mathsf{f}:\mathbb{R} o\mathbb{R}$$
 be given by $\mathsf{f}(\mathsf{x})$ = x + $\sqrt{x^2}$ is

A. injective

B. surjective

C. bijective

D. none of these.

Answer:

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19. Choose the correct statement .

A. One-to-one function have inverse

B. Onto function have inverse

C. bijection function have inverse

D. many - to -one function hae inverse

Answer: A::B::C



20. Match List - I with List II

List I		ListII	
i.	$\{(1,1)(2,2)(3,3)(1,2)\}$	(b)	equivalence
ii.	$\{(1,2)(2,1)(2,3)(3,2)\}$	(b)	transitive
iii.	$\{(1,1)(2,3)(1,3)\}$	(c)	Symmetric
iv.	$\{(1,1)(2,2)(3,3)(1,2)(2,1)(2,3)(1,3)\}$	(d)	reflexive

A.cdba

B.dcba

C.badc

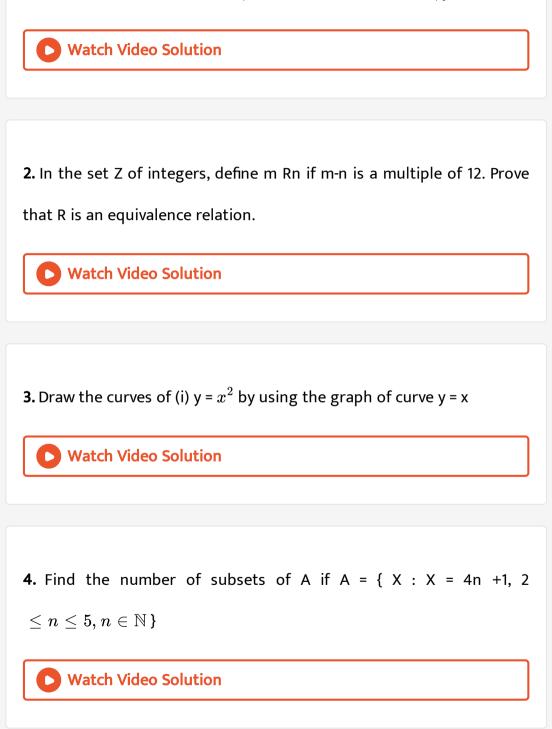
D. b a b c

Answer: A::B::C::D



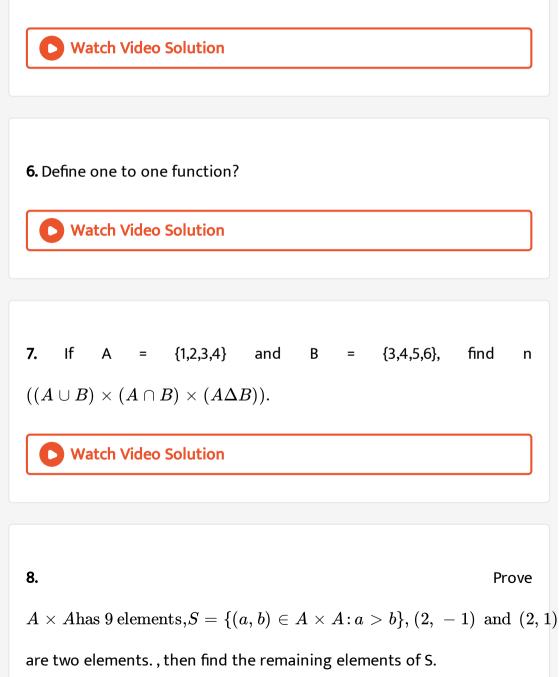
Additional Problems Section B

1. If n ($A \cap$ B) = 3 and n ($A \cup B$) = 10 then find n [P ($A\Delta B$)]



5. Let f={(1,4),(2,5),(3,5)} and g={(4,1),(5,2),(6,4)}. Find gof Can you find

fog?





Additional Problems Section C

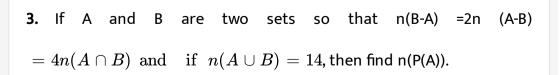
- 1. Draw the graph of the functions f (x) = |x|, f(x) = |x-1| and f(x) =
- $(x-1)^2$

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2. If f : R - (-1,1)
$$\rightarrow$$
 R is defined by f(x) = $\frac{x}{x^2 - 1}$, verify whether f is one

to one.





4. If the function f and g are given by $f = \{(1,2), (3,5), (4,1)\} g = \{(2,3), (5,1), (4,1)\} g = \{(3,3), (5,1), (5,1), (5,1)\} g = \{(3,3), (5,1), (5,1), (5,1)\} g = \{(3,3), (5,1), (5,1), (5,1), (5,1), (5,1)\} g = \{(3,3), (5,1), (5,1), (5,1), (5,1), (5,1), (5,1)\} g = \{(3,3), (5,1$

(1,3)} find range of f and g. Also write down fog.



5. Find the pairs of equal sets, if any, give reasons:

$$A = \{0\}, B = \{x : x > 15 \text{ and } x < 5\},\$$

$$C=\{x\!:\!x\!-\!5=0\}, D=ig\{x\!:\!x^2=25ig\},$$

E = {x : x is an integral positive root of the equation $x^2 - 2x - 15 = 0$ }.

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Additional Problems Section D Marks 5

1. A relation R is defined on the set z of integers as follows : (x,y) $\in \mathbb{R} \Leftrightarrow x^2 + y^2 = 25$. Express R and R^{-1} as the set of ordered pairs

and hence find their respective domains.



2. If $f: \mathbb{R} \to \mathbb{R}$ is defined by f(x) = 2x - 3, then prove that f is a bijection

and find its inverse.

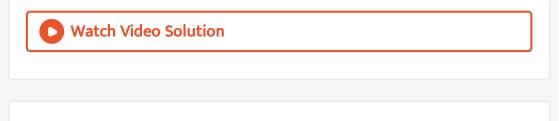
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3. If the function f is defined as
$$f(x)= egin{cases} 3x-2 & x>3\ x^3-2 & -2\leq x\leq 2\ 2x+1 & x<-2 \end{cases}$$

Then find the values, if exists f(4), f(-4), f(0), f(-7).

4. Let A = {0,1,2,3}. Construct relation on A of the following type.

not reflexive, not symmetric, not transitive



5. Let A = {0,1,2,3}. Construct relation on A of the following type.

not reflexive, not symmetric, transitive

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6. Let A = {0,1,2,3}. Construct relation on A of the following type.

not reflexive, symmetric , not transitive



7. Let A = {0,1,2,3}. Construct relation on A of the following type.

not reflexive, symmetric , transitive

8. Let A = {0,1,2,3}. Construct relation on A of the following type.

reflexive, not symmetric, not transitive

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9. In a survey of 5000 persons in a town, it was found that 45% of the persons know Languages A, 25% know language, B, 10% know language C, 5% know languages A and B, 4% know languages B and C, and 4% know Language A and C. If 3% of the persons know and the three Languages, find the number of persons who knows only Languages A.

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10. Let f , $g:\mathbb{R}\to\mathbb{R}$ be defined as f(x) = 2x -|x| and g(x) = 2x+|x|. Find

f(g).

11. Let $A = \{2, 3, 5\}$ and relataion $R = \{(2, 5)\}$ write down the minimum number of ordered pairs to be indluded to R to make it an equivalence relation.