MATHS

BOOKS - PREMIERS PUBLISHERS

SETS,RELATIONS AND FUNCATIONS

Worked Examples

1. If A and B are two sets so that $n(B-A)=2n(A-B)=4n(A\cap B)$ and if $n(A\cup B)=21$. Find n(p(B))

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2. In a class of 100 students 46 students play football, 26 students play hockey, 11 students play volley ball. 6 play football and hockey, 5 play hockey and volley ball and 5 play football and volley ball. 4 play all the three games. Find the number of students play only! football

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3. Find the number of subsets of A if

$$A = \{x : x = n^2 + 1, 3 \leq n \leq 7, n \in N\}.$$

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4. Two sets A and B are such that n(A) = m and (B) = k. If the number of subsets A and B is! 144, find the values of m and k.

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5. If A = {a,b,c} B = {c, d, e, find $n(A \cup B) \times n(A \cap B) \times n(A \Delta B)$.

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6. If n(A) = 12 and $n(A \cap B) = 5$,find $n((A \cap B)' \cap A)$

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7. In the set of integers Z, define mRn if m-n is a multiple of 5. Is R equivalence relation"?

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8. S is the set of all first n natural numbers. A relation R is defined as $R = \{(x, x) / xeS\}$. Is R reflexive? Is RSymmetric? Is R transitive?

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9. Let S = (a, b, c) and R= {(a, a),(a, b), (b, b), (a, c), (c, a)}. IfR is to be equivalence relation. "Find the minimum number of ordered pairs to be included.

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10. Check for one and onto.(i) $f: N \rightarrow N$define by f(n)=2n-17

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11. Check for one and onto.(i) $f: N \cup N\{0\} \rightarrow$

define by f(n)=n+1

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12. " Check for one and onto.(i)

$f: N \rightarrow Ndef \in eby$f(n)=n^(2)`

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13. Check for one and onto.(ii) $f: R \rightarrow R$define by $f(n) = \frac{1}{2}$

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14. If $f: R \rightarrow R$ is defined as f (x) = x^(2) + 1. Find the pre images of 26, 5 and - 3.

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15. If $f:(-3,3) \to A$ is given by $f(x) = x^3 + 2$. Find A so that f 'is onto.

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16. If f:R-{-2,2}toR$is given by$(2x)/(x^(2)-4)`verfy whether f is one or not

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17. Find the largest possible domain for the real valued function f defined by $f(x) = \sqrt{x^2 - 4x + 3}$.

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18. find the range of $f(x) = \frac{1}{1 + 4\cos x}$

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19. Find the domain of $f(x) = \frac{1}{1 - 2\sin x}$

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20. Find the domain of the real valued function given by $f(x) = \frac{\sqrt{16 - x^2}}{x^2 - 9}$

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21. Let f and g be two functions from R to R defined by f (x) = 2x + 3 and $g(x) = x^2$. Find $f \circ g$ and $g \circ f$.

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22. Let f, g, h be three functions from R to R defined by f(x)=x+3,$g(x) = 2x^2$,h(x) = 3x +1. Show that (fog)oh=fo(goh).

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23. Let f= {(2, 5), (3, 6), (4, 6)} and g = {(5,2), (6,3), (7,5)}. Find $g \circ f$. Can we find $f \circ g$?

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24. Give an example, such that if f and: $g \circ f$ are one-one then g need not be one-one.

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25. Letf,$g: R \to R$ be defined as f(x) = 3x - |x| and g(x) = 3x + | x |, find $f \circ g$.

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26. If $R \to R$ is defined byf (x) = 3x + 1. Prove that f is bijection and find its inverse.

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Solution To Exercise 1 1

1. Write the in roster form.

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

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2. Write the in roster form.

the set of all positive roots of the equation (x-

1) (x+1) $(x^2 - 1)$=0.

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3. Write the following in roster form.

(iii) $\{x \in N : 4x + 9 < 52\}$

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4. Write the in roster form.

$$\left\{x : \frac{x-4}{x+2} = 3, x \in \mathbb{R} - \{-2\}\right\}$$

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

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6. State whether the sets are finite or infinite.

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

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7. State whether the sets are finite or infinite.

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

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8. State whether the following sets are finite or infinite.

(iii) $\{x \in Z : x$ is even and less than 10$\}$.

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

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

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

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

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

$(A \times B) \cap (B \times A) = (A \cap B) \times (B \cap A)$

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

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

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

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

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15. Justify the trueness of the statement " An element of a set can never be a subset of itself ".

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

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18. For a set A, $A \times A$ contains 16 elements and two of its elements are (1,3) and (0,2). Find the elements of A.

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19. If $A \times A$ has 16 elements, S = {(a,b) $\in A \times A : a < b\}$, (-1,2) and (0,1) are two elements of S, then find the remaining elements of S.

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Solution To Exercise 1 2

1. State whether the following sets are finite or infinite.

(iv) $\{x \in R : x$ is a rational number$\}$.

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2. 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".

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3. 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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4. 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"

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

(iv)Let A be the set consisting of all the 3. Let female members of a family. The relation R defined by"aRb if a is "not" a sister of b""

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6. 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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7. 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.

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8. 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.

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9. 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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10. 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.

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11. Prove that the relation " friendship " is not an equivalence relation on the set of all people in Chennai.

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

(i) reflexive (ii) symmetric

(iii) transitive (iv) equivalence.

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

the equivalence relation of largest cardinality on A?

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14. 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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15. 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.

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Solution To Exercise 1 3

1. State whether the sets are finite or infinite.

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

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2. 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.

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3. Write the values of f at -4,1,-2,7,0 if f(x)=

$$\begin{cases} -x+4 & \text{if} \quad -\infty < x \leq -3 \\ x+4 & \text{if} \quad -3 < x < -2 \\ x^2 - x & \text{if} \quad -2 \leq x < 1 \\ x - x^2 & \text{if} \quad 1 \leq x < 7 \\ 0 & \quad \text{otherwise} \end{cases}$$

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4. Write the values of f at -3,5,2,-1,0 if f(x)=

$$\begin{cases} x^2 + x - 5 & \text{if} \quad x \in (-\infty, 0) \\ x^2 + 3x - 2 & \text{if} \quad x \in (3, \infty) \\ x^2 & \text{if} \quad x \in (0, 2) \\ x^2 - 3 & \quad \text{otherwise} \end{cases}$$

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

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

not one-to -one but onto.

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8. 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 but not onto.

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9. 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.

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

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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.

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14. Let f and g be two functions from R to R defined by f (x) = 2x + 3 and $g(x) = x^2$. Find $f \circ g$ and $g \circ f$.

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15. If f and g are real valued functions define by $f(x) = 2x - 1$ and $g(x) = x^2$ then find (iii) $(f + g + 2)(x)$

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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.

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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.

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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.

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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.

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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 is also a function and verify the symmetrical property about the line y = x (by drawing the lines).

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Solution To Exercise 1

1. 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 $A \times B$, find A and B, where x,y,z are distinct elements.

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Solution To Exercise 1 4

1. For the curve y = x^3 given in figure draw,

y = -x^3

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2. For the curve , $y = x^{\frac{1}{3}}$ given in figure draw.

$y = -x^{\left(\frac{1}{3}\right)}$

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3. 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.

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4. 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.

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5. From the curve $y=\sin x$, graph the functions.

$y=\sin(-x)$

6. From the curve $y=x$, draw

$y=x+1$

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

y = |x-1|+1

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8. From the curve y = sin x draw y = sin |x| (Hint

: sin (-x) = -sin x.)

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Solution To Exercise 1 5

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: C

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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: B

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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: D

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

A. `f(x)={(-2x" "x" "in" "(-oo","-2)),(4" "x" "in" "(-2","2)),(2x" "x" "in" "(2","oo)):}

B. `f(x)={(2x" "x" "in" "(-oo","-2)),(4" "x" "(-2","2)),(-2x" "x" "in" "(2","oo)):}

C. `f(x)={(2x" "x" "in" "(-oo","-2)),(-4" "x" "(-2","2)),(-2x" "x" "in" "(2","oo)):}

D. `f(x)={(-2x" "x" "in" "(-oo","-2)),(2" "x" "(2","2)),(2x" "x" "in" "(2","oo)):}

Answer: A

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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 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

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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'

C. Both S and T are equivalence relation

D. N

Answer: D

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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: B

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

A. 6

B. 4

C. 8

D. 16

Answer: B

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

A. 2^3

B. 3^2

C. 6

D. 5

Answer: C

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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

A. 2^{17}

B. 17^2

C. 34

D. insufficient data

Answer: B

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

A. $A \cap B$

B. $A \times A$

C. $B \times B$

D. none of these

Answer: B

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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

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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 the above

Answer: A::C

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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. transitive Hinta

C. symmetric

D. equivalence

Answer: B

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15. 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: A::C::D

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

A. [0,1]

B. $[0, \infty]$

C. [0,1)

D. (0,1)

Answer: A::C

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

A. R,R

B. R,$(0, \infty)$

C. $(0, \infty)$R

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

Answer:

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18. The number of relations from a set containi 4 elements to a set containing 3 elements is

A. mn

B. m

C. n

D. m+n

Answer: C

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19. The function $f : [0,2\pi] \to 1$ [-1,1] defined by $f(x) = \sin x$ is

A. one-to-one

B. onto

C. bijection

D. cannot be defined

Answer: B

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

A. [-9,9]

B. R

C. [-3,3]

D. [0,9]

Answer: D

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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: A::C::D

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22. The inverse of f(x) =

$$\begin{cases} x & \text{if} \quad x < 1 \\ x^2 & \text{if} \quad 1 \leq x \leq 4\text{is} \\ 8\sqrt{x} & \text{if} \quad x > 4 \end{cases}$$

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

A. R

B. $(1, \infty)$

C. $(-1, \infty)$

D. $(\infty, -1)$

Answer: A::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 even function

C. an even function

D. both odd function and even function

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

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

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Problems For Practice I Answer The Following Questions

1. If A and B are two sets so that $n(B-A)=3n(A-B)=9n(A\cap B)$ and if $n(A\cup B)=26$, find n(p(A)).

Watch Video Solution

2. If A = (1, 2, 3, 4), B =(3, 4, 5, 6), find $n(A\cup B)\times n(A\cap B)\times n(p(A))$.

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3. Prove that set of similar triangles, 'is similar to' is an equivalence relation

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4. Prove that set of similar triangles, 'is similar to' is an equivalence relation

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5. Find the domain and range of $\frac{1}{1-\cos x}$.

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6. If R in R : f is defined by $f(x) = \frac{x^2 - 2x + 1}{x^2 + x + 1}$ verify whether f is one-one or not.

View Text Solution

7. If f and g are two functions from R to R defind by f(x) = 4x - 3, $g(x) = x^2 + 1$, find fog and $g \circ f$.

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8. On a set of natural numbers let R be the relation defined by aRb if $a + 2b = 15$. Write down the relation by listing all the pairs. Check whether it is reflexive, symmetric, transitive, equivalence.

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9. Check whether the following functions are one to one and onto

(i) $f: N \rightarrow N$ defined by f(x) = x +3.

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10. Check whether the following functions are one to one and onto

(ii): $N \cup (-2, -1, 0) \rightarrow N$ defined by S(x) = x +3.

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Ii Choose The Correct Option For The Following M C Q

1. If $f: R \to R$ is defined by f(x) = 3x - 4 is bijective, its inverse $f^{-1}(x)$ is:

A. $\frac{x+4}{3}$

B. $\frac{x-4}{3}$

C. 3x-4

D. 4x+3

Answer: A

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2. Let $f: R \to R$ be defined by fx) = 2 – [x]. The range of f is:

A. R

B. $(2, \infty)$

C. $(-2, \infty)$

D. $(-\infty, 2)$

Answer: D

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3. If A=(1,2,3,4) B = (3,4,5,6) then $n(A \cup B) \times (A \cap B) \times (A \Delta B)$ is:

A. 48

B. 32

C. 64

D. none of the above

Answer: A

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4. If P(a) denotes the Power set A and A is void set, then n(P(P(P(a)))) is:

A. 8

B. 6

C. 4

D. 2

Answer: C

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5. The number of relations form a set containing melements to a set containing n elements is

A. $m \times n$

B. 2^{m+n}

C. $\frac{m}{n}$

D. 2^{mn}

Answer: D

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6. Let A = {1,2,3) and p = {(1,2), (2,1), (1,1),(2,3), (2,2)) then to make p is reflexive and symmetric is the following are included:

A. (3,3)

B. (3,2)

C. (3,2) and (3,3)

D. (1,3),(3,1)

Answer: C

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7. The domain of $f(x) = \dfrac{1}{1 - 2\cos x}$ is:

A. $R \pm \dfrac{\pi}{3}$

B. $2n\pi \pm \dfrac{\pi}{3}, n \in Z$

C. $2 - \left(2n\pi \pm \dfrac{\pi}{3}\right), n \in Z$

D. None of the above

Answer: C

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8. The largest domain for the real valued function given by $f(x) = \frac{\sqrt{16 - x^2}}{\sqrt{x^2 - 1}}$ is:

A. [-4,4]

B. [-1,1]

C. (4,-4)

D. $[-4, -1) \cup (1, 4)$

Answer: D

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9. Let f and g be two functions from R to Rdefined by f(x) = 3x – 2 and $g(x) = x^2 + 3$. Then $g \circ f$is:

A. $9x^2 - 12x + 7$

B. $3x^2 + 7$

C. $9x^2 + 12x - 7$

D. $3x^2 + 4$

Answer: A

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10. If the function $f:(-2,2] \to S$ is defined by $f(x) = x^2$ is onto then Sis:

A. [-4,4]

B. R

C. [-2,2]

D. [0,4]

Answer: D

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11. Find the correct statement in the following: The function $f(x) = x + x^2$ is:

A. even function

B. odd function

C. both even and odd function

D. neither even nor odd

Answer: D

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12. Find the incorrect statement:

A. Iff and $g \circ f$ are one to one then g is one to one.

B. $f \circ g - g \circ f$ (in general)

C. Iff and g are one to one $g \circ f$ is also one to one.

D. fand g are real valued functions defined on then (fg)(x) g(x)

Answer: B

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13. Find the incorrect statement:

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

B. $A \times B = B \times A$ if and only if A=B

C. If S = (1,2,3) and R-{(1, 1) (1, 2), (2, 2),(1, 3) (3, 1) (3, 3)) is reflexive.

D. S-{$x \in R : x$ is rational number) is a finite set.

Answer: D

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14. Find the correct statement:

A. A function is one to one if

$$f(a) = f(b) \Rightarrow a = b.$$

B. Constant function is always onto

C. All even functions are one to one

D. Product of two odd functions is also odd function.

Answer: A

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15. Find the odd man out:

A. $f(x) = x^3$

B. $f(x) = x^3 + 3x$

C. f(x)=sinx

D. f(x)=cosx

Answer: D

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16. Find the odd man out: Let A-(1,2,3,4) then

A. (1, 1) (1.3) (1, 4) (2, 2)

B. (1, 1) (2, 2) (3, 3) (4,4)

C. (1, 3) (3, 1) (2, 4) (4,2)

D. (1, 3) (2, 3) (3, 3) (4,3)

Answer: D

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17. Find the odd man out: Let X - {1,2,3,4), Y = {a,b,c,d,e)

A. (1, a) (2, c) (3, e) (4, b)

B. (1, a) (2, a) (3, a) (4, a)

C. (1, a) (2, c) (3, b) (4, b)

D. (1, a) (2, c) (3, e)

Answer: D

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18. The set of all numbers greater than 0 is an .....interval

A. finite

B. infinite

C. closed

D. open

Answer: B

19. The product of an odd function and an even function is:

A. even

B. equivalent

C. odd

D. none of these

Answer: C

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20. Match the following: Let A -(0, 1, 2, 3) then the relations R_1, R_2, R_3, R_4, R_5 are given and

their properties are given below.

20.	R_1:{(1, 2) (2, 4)}	*(a)* Reflexive, transitive, not symmetric
21.	R_2:{(0, 0) (1, 1) (2, 2) (3, 3) (1, 2)}	*(b)* Reflexive, symmetric, not transitive
22.	R_3:{(0, 0) (1, 1) (2, 2) (3, 3)}	*(c)* Reflexive, not symmetric, not transitive
23.	R_4:{(0,0)(1,1)(2,2) (3, 3) (1, 2) (2, 3) (2, 1) (3, 2)}	*(d)* Equivalence
24.	R_5:{(0,0)(1,1) (2,2)(3,3)(1,2) (2,3)}	***(e)* not reflexive, not symmetric, not transitive**

A. Reflexive, transitive, not symmetric

B. Reflexive symmetric, not transitive

C. Reflexive not symmetric, not transitive

D. not reflexive not symmetric, not transitive

Answer:

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21. Let A and B be two sets. Then A-B equals

A. m=n

B. $m \geq n$

C. mltn

D. mgtn

Answer:

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22. Find the odd one out:

A. bijective

B. one to one

C. onto

D. equivalence

Answer: D

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23. Assertion: If f, g, h are real valued functions then f(g+h)=fg+fh.

Reason: If f,g,h are real valued functions (fg)(x)=f(x) g(x).

A. Both Assertion and Reason are correct, Reason is correct explanation for A.

B. Both Assertion and Reason are correct

Reason is not correct explanation for A

C. Assertion is true, Reason is not true.

D. Assertion is not true, Reason is true.

Answer: A

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24. Assertion: The product of even functions an odd function is an odd function.

Reason: $f(x) = x^2$ is even function, g(x)= an odd function.

A. Assertion is true but Reason is not true

B.) Assertion is true but Reason is not true.

C. Using Reason we can prove Assertion.

D. Using Reason we cannot prove Assertio

Answer: C

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25. The number of reflective relations one containing n elements is:

A. 2^{12}

B. 2^{4}

C. 2^{16}

D. 2^{8}

Answer: A

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26. The number of relations from a set containi 4 elements to a set containing 3 elements is

A. 2^{16}

B. 2^9

C. 2^7

D. 2^{12}

Answer: D

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27. Domain of the function $y = \frac{x-1}{x+1}$ is:

A. 1R

B. Q

C. R-(-1)

D. R-1

Answer: C

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28. If $f: R \to R$ is defined by f(x) = 2x - 3:

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

B. $\frac{1}{2x+3}$

C. $\frac{x+3}{2}$

D. $\frac{x-3}{2}$

Answer: C

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29. $\mathrm{n}(A \cap B) = 4$ and $n(A \cup B) = 11$ then $n(p(A \Delta B))$ is:

A. 44

B. 256

C. 64

D. 128

Answer: D

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30. n(p(A)) = 512, n(p(B) = 32, $n(A \cup B) = 16$, find $n(A \cap B)$:

A. 2

B. 9

C. 4

D. 5

Answer: A

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31. Let S (1,2,3). R be(1, 1) (1.2) (2, 2) (1.3) (3.1), what are the elements to be included to make R reflexive:

A. (3, 3)

B. (2,3)

C. (3,2)

D. none of these

Answer: A

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32. The natural domain of the function $y = \sqrt{9 - x^2}$ is :

A. $-3 \leq x \leq 3$

B. $-3 < x < 3$

C. $0 < x < 3$

D. $(-\infty, -3) \cup (3, \infty)$

Answer: A

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33. Let X=a, b, c, y = (1, 2, 3) then $f : x \rightarrow y$ given by (a, 1) (6, 1) (6, 1) is called:

A. onto

B. constant function

C. one-one

D. bijective

Answer: B

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34. If $f:[-2,2] \to A$ is given by $f(x) = 3^3$ then f is onto, if A is:

A. [3,3]

B. (3,3)

C. [-24,24]

D. (-24,24)

Answer: C

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35. Find which two are correct from the following.

(i) $\left(x^3 + \sin x\right)$ is an odd function.

(ii) If A is a set having 4 elements then the power set will have 64 elements.

(iii) If a relations is reflexive, antisymmetric and transitive it is called equivalence relation.

(iv) The product of two odd functions are even.

A. (i) and (ii) are correct

B. (i) and (iv) are correct

C. (ii) and (iii) are correct

D. (iii) and (iv) are correct

Answer: B

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