MATHS

BOOKS - PRADEEP PUBLICATION

RELATIONS AND FUNCTIONS

Example

1. Let A = {1,2,3,4} and B= {x,y,z}. Consider the subset R = {1, x), (1,y),(2,z),(3,x)} of $A \times B$. Is R, a relation from A to B? If yes, find domain and range of R. Draw arrow diagram of R.

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2. Let A = (2,3,4,5,6,7,8,9). Let R be the relation on A defined by (x,y):x $\in$ A, y $\in$ A and x divides y .Find R

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3. Let A = (2,3,4,5,6,7,8,9). Let R be the relation on A defined by (x,y):x $\in$ A, y $\in$ A and x divides y .Find domain of R

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4. Let A = (2,3,4,5,6,7,8,9). Let R be the relation on A defined by (x,y):x $\in$ A, y $\in$ A and x divides y .Find range of R^{-1}

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5. Let A be a family of sets and let R be the relation on A defined by X is disjoint from Y. State whether or not R is reflexive on A

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6. R={(b,c)} is defined on set A={a,b,c}. State whether or not R is symmetric

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7. R={(b,c)} is defined on set A={a,b,c}. State whether or not R is transitive

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8. Consider the set A = {a, b, c}. Give an example of a relation R on A. which is : reflexive and symmetric but not transitive.

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9. Consider the set A = {a, b, c}. Give an example of a relation R on A. which is : Symmetric and transitive but not reflexive.

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10. Consider the set A = {a, b, c}. Give an example of a relation R on A. which is : reflexive and transitive but not symmetric.

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11. Give an example of a relation. Which is: Symmetric but neither reflexive nor transitive.

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12. Give an example of a relation. Which is: Transitive but neither reflexive nor symmetric.

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13. Give an example of a relation, which is Reflexive, but neither Symmetric nor Transitive.

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14. Consider the set A = {a, b, c}. Give an example of a relation R on A. which is : reflexive and symmetric but not transitive.

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15. Consider the set A=(a,b,c). Give an example of a relation R on A which is an equivalent relation.

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16. For the set A = (1,2,3) define a relation R on the set A as follows:

$R = (1, 1), (2, 2), (3, 3), (1, 3)$. Write the ordered paris to be added to R to make it the smallest equivalence relation.

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17. Let A = (a,b,c) and R be the relation defined on A as follows R = (a,a), (b,c), (a,b) Write minimum number of ordered pairs to be added to R to make R reflexive and transitive.

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18. Show that the number of equivalence relation in the set {1, 2, 3} containing (1, 2) and (2, 1) is two.

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19. Check whether the relation R defined in the set (1, 2, 3, 4, 5, 6) as R= {(a, b) : b = a +1)} is reflexive, symmetric or transitive ?

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20. Check whether the relation R in R, defined by $R = \{(a, b): a \leq b^3$) is reflexive, symmetric or transitive ?

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21. Let A be the set of human beings living in a town at a particular time and R be the relation on A defined by R = (x,y) : x is exactly 7 cm taller than y). Check whether the relation R is reflexive, symmetric or transitive on A.

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22. Show that the relation R defined by

$(a, b)R(c, d) \Rightarrow a + d = b + c$ in the set N is an equivalence relation.

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23. If R is a relation in $N \times N$, show that the relation R defined by (a, b) R (c, d) if and only if ad = bc is an equivalence relation.

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24. Let N denote the set of all natural numbers and R be the relation on NxN defined by $(a, b)R(c, d)$<=>$ad(b+c) = bc(a+d)$. Check whether R is an equivalence relation on $N \times N$.

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25. Let L be the set of all lines in a plane and R be the relation on L defined as R = (l,m) : l is perpendicular to m). Check whether R is reflexive, symmetric or transitive.

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26. Show that the relation R, defined by the set A of all triangles as : $R = \{(T_1, T_2) = T_1$ is similar to T_2}` is an equivalence relation. Consider three right-angled triangles T_1 with sides 3, 4, 5, T_2 with sides 5, 12, 1 3 and T_3 with sides 6, 8, 10.

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27. Let $f : X \rightarrow Y$ be an function. Define a relation R in X given by : R = {(a,b) : f(a) = f(b)}`. Examine, if R is an equivalence relation.

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28. For complex numbers $Z_1 = x_1 + Iy_1$ and $z_2 = x_2 + iy_2$ we write $z_1 \cap z_2 \quad \text{if} \quad x_1 \leq x_2$ and $y_1 \leq y_2$

Then for all complex number z with $1 \cap z$, show that we have $\dfrac{1-z}{1+z} \cap 0$

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29. For complex numbers $Z_1 = x_1 + Iy_1$ and $z_2 = x_2 + iy_2$ we write $z_1 \cap z_2$ if $x_1 \le x_2$ and $y_1 \le y_2$

Show that the relation `nn' is reflexive and transitive on the set C of complex numbers.

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30. For complex numbers $Z_1 = x_1 + Iy_1$ and $z_2 = x_2 + iy_2$ we write $z_1 \cap z_2$ if $x_1 \le x_2$ and $y_1 \le y_2$

Is $\cap$ symmetric?

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31. Let R be a relation on the set A of ordered pairs of positive integers defined by R, $(x, y)R(u, v)$, if and only if $xv = yu$. Show that R is an equivalence relation.

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32. Let m be a fixed non-zero integer. For integer a,b, we say that they are congruent modulo m iff a-b is divisible by m. We write this as a $\equiv$ b (mod m). Let R be the relation on the set Z of integers defined by aRb iff a $\equiv$ b (mod m). Show that R is an equivalence relation on Z.

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33. If R is a relation on a set A, prove that R is symmetric iff R^{-1} = R.

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34. If R_1 and R_2 are equivalence relations in a set A, show that $R_1 \cap R_2$ is also an equivalence relation

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35. If

$N_7 = \{1, 2, 3, 4, 5, 6, 7\}, does the follow \in g partition give rise \to an \equiv a \leq$

Why?A _1 = (1,2,5,6), A _2 = {3}, A_3 = {4,6}`

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36. If A = (1,2,3,4,5,6,7), which of the following is a partition giving rise to an equivalence relation ? If yes, write the equivalene relation and if no, give reason.

`B_1= (1,2,5,7), B_2 (3), B_3 = (4,6)

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37. If

$N_7 = \{1, 2, 3, 4, 5, 6, 7\}, does the follow \in g partition give rise \to an \equiv a \leq$

Why?A _1 = (1,2,5,6), A _2 = {3}, A_3 = {4,6}`

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38. If A and B are finite sets containing respectivley m and n elements, then find the number of relatiosn that can be defined form A to B.

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39. If A and B are finite sets containing respectivley m and n elements, then find the number of relatiosn that can be defined form A to B.

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40. If A = {1,2,3} and f,g are relations corresponding to the subset of $A \times A$ indicated against them,which of f,g, is a function? Why? F(1,3),(2,3),(3,2) , g = (1,2),(1,3),(3,1)

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41. If A = {1,2,3} and f,g are relations corresponding to the subset of $A \times A$ indicated against them,which of f,g, is a function? Why? F(1,3),(2,3), (3,2) , g = (1,2),(1,3),(3,1)

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42. If A = {1,2,3} and f,g are relations corresponding to the subset of $A \times A$ indicated against them,which of f,g, is a function? Why? F(1,3),(2,3), (3,2) , g = (1,2),(1,3),(3,1)

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43. Let $A = \{-1, 0, 1, 2\}$, $B = \{-4, -2, 0, 2\}$ and $f, g : A \to B$, be functions defined by $f(x) = x^2 - x, x \in A$ and g(x)= 2|x-(1/2)|-1, x in A`. Are f and g equal? Justify your answer.

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44. Let f : R $\rightarrow$ R be defined by f (x) = x +1 determine whether or not f is onto.

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45. Let f, g be the functios f = ((1,5), (2,6), (3,4)), g = ((4,7), (5,8), (6,9))` write the range of f and also that of g . Find gof.

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46. Let f = ((1,3), (2,1),(3,2)) $\text{ and } g =$ ((1,2), (2,3),(3,1))`, then find (gof) (1) and (fog) (2).

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47. If $f: R \rightarrow R$ is defined by $f(x) = \dfrac{x}{x^2 + 1}$ then f(f(2)) is

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48. If f (X = $X^2 - 3x + 2$ be a real valued function of the real variable, find fof.

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49. Let f : $R \rightarrow R$ be defined by f(x) = 3x - 2 ad g : R $\rightarrow$ R be defined by g(x) $= \dfrac{x+2}{3}$. Shwo that fog = $I_R = gof$

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50. If f(x) = $x^2 + 1$ and g(x) = 3x - 1` then find formulae for the following functions:

gof

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51. If f(x) = $x^2 + 1$ and g(x) = 3x - 1` then find formulae for the following functions:

fog

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52. If f(x) = $x^2 + 1$ and g(x) = 3x - 1` then find formulae for the following functions:

fof

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53. If f(x) = $x^2 + 1$ and g(x) = 3x - 1` then find formulae for the following functions:

gog

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54. If $f(x) = \left(\frac{1}{x}\right)$ and g (x) = $\frac{1-x}{1+x}$ find D_{gof} and D_{fog}. Also find (gof) (x) and (fog) (x).

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55. If the formula $f: R \rightarrow R$ be given by $f(x) = x^2 2$ and g : $R \rightarrow R$ be given by g(x) = $\frac{x}{x-1}$. $X \ne 1$. Find fog and gof. Hence find (fog) (2) and (gof (-3)`

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56. If f(X) = $\sqrt{x}(x \geq 0)$ and g (x) = $x^2 - 1$, check whether or not fog = gof.

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57. Let A = (1,2). Find all the functions from A to A. How many of these are one-one?

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58. Let X = $(-2, -1, 0, 1, 2, 3)$ and Y = (0,1,2,.....,10) and f : $X \rightarrow Y$ be a function defined by f(x) = x^2 for all x $\in$ X, find f^{-1} (A) where A = (0,1,2,4)

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59. Let A = (a,b,c) and B = (p,q,r) and a function f : $A \rightarrow B$ be given by f = $((a, q), b, r), (c, p))$ Is f invertible ? If so, find f^{-1} and verify that $f^{-1}of = I_A$ and $fof^{-1} = I_B$ where I_A and I_B are identity fucnctions on A and B respectively.

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60. Let f : $R \rightarrow R$ be defined by f(X) = 10 x + 7. Show that f is invertible. Find f^{-1}

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61. Draw the graph of the function $f(X) = x^2$ and show that it is not invertible. Restrict its domain suitably so that f^{-1} may exist, find f^{-1} and draw its graph.

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62. Let A be a non-empty set and f : A $\rightarrow$ A, g : A $\rightarrow$ A be two functions such that fog = $I_A = gof$, show that f and g are ijections and that g $= f^{-1}$

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63. Let f : A $\rightarrow$ B and g : B $\rightarrow$ C be onto functions, show that gof is an onto function.

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64. Show that if $f: A \rightarrow B$ and $g: B \rightarrow C$ are one-one, then $gof: A \rightarrow C$ is also one-one.

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65. Let $f: X \rightarrow Y$ and $g: Y \rightarrow Z$ be two invertible functions. Then gof is also invertible with $(gof)^{-}1 = f^{-}1ofg^{-}1$

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66. Let $f: NrarR$ be a function defined as : $f(x) = 4x^2 + 12x + 15.$ Show that $f: N \rightarrow S$ where S is Range f is invertible. Find the invere of 'f'.

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67. Show that $f: N \rightarrow N$ given by : $f(x) = \{x + 1, \quad \text{if} \quad xisoddx - 1$, if x is even is both one-one and onto.

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68. Show that the table gives a commutative binary composition '*' on the set A = (a,b,c). What is the identity element?

*	a	b	c
a	b	c	a
b	c	a	b
c	a	b	c

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69. Let a mapping '*' from $Q \times Q$ to Q (set of all rational numbers) be defined by a* b = a +2 b for all a, b $\in$ Q. Prove that * is a binary operation on Q

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70. Let a mapping '*' from $Q \times Q$ to Q (set of all rational numbers) be defined by a* b = a +2 b for all a, b $\in$ Q. Prove that the given operation is not commutative.

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71. Let a mapping '*' from $Q \times Q$ to Q (set of all rational numbers) be defined by a* b = a +2 b for all a, b $\in$ Q. Prove that the given operation is not associative.

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72. Let '*' be a binary operation on the set n of natural numbers defined by the rule a* b = a^b for all a , b $\in$ N. Is '*' commutative

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73. Let '*' be a binary operation on the set n of natural numbers defined by the rule a* b = a^b for all a , b $\in$ N. Is '*' associative?

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74. Number of binary operations on the set {a, b} is

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75. Show that the number of binary operations on {1, 2} having 1 as identity and having 2 as the inverse of 2 is exactly one.

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76. Let S be the set of all real numbers except 1 and 'o' be an operation on S defined by : aob = a+b - ab for all a,b $\in$ S. Prove that S is closed under given operation.

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77. Let A be the set of all real numbers except - 1 and 'o' be the mapping form $A \times A$ to A defined by a o b = a + b + ab for all a, b $\in$ A. Prove that the given operation is commutative.

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78. Let A be the set of all real numbers except - 1 and 'o' be the mapping form $A \times A$ to A defined by a o b = a + b + ab for all a, b $\in$ A. Prove that the given operation is associative.

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79. Let A be the set of all real numbers except - 1 and 'o' be the mapping form $A \times A$ to A defined by a o b = a + b + ab for all a, b $\in$ A. Prove that 0(zero) is the identify element.

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80. Let S be the set of all real numbers except 1 and 'o' be an operation on S defined by : aob = a+b - ab for all a,b $\in$ S. Prove that S is closed under given operation.

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81. Let A = Q - (0), where Q is the set of rationals. Let * : $A \times A \rightarrow A$ be defined as $a \cdot b = \frac{3ab}{5}$ for all a,b $\in$ A. Check whetehr * is commutative or associative. Find the identity element for * and inverse of a in` A (if it exists).

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82. Let A = $N \times N$, N being the set of natural numbers. Let * : $A \times A \rightarrow A$ be defined as $(a, b) \cdot (c, d) = (ad + bc, bd)$ for all (a,b), (c,d) $\in$ A. Show that '*' is commutative

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83. Let A = $N \times N$, N being the set of natural numbers. Let * : $A \times A \rightarrow$ A be defined as $(a, b) \cdot (c, d) = (ad + bc, bd)$ for all (a,b), (c,d) $\in$ A. Show that '*' is associative.

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84. Let A = $N \times N$, N being the set of natural numbers. Let * : $A \times A \rightarrow$ A be defined as $(a, b) \cdot (c, d) = (ad + bc, bd)$ for all (a,b), (c,d) $\in$ A. Show that identify element w.r.t. '*' does not exist.

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85. Let $A = Q \times Q$, where Q is the set of all rational numbers and * be a binary operaton on A defined by (a,b) * (c,d) = (ac, ad+b) for all (a,b), (c,d) $\in$ A. Then find the identify element of * in A.

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86. Let $A = Q \times Q$, where Q is the set of all natural involved and * be the binary operation on A defined by (a,b)* (c,d) =(ac,b+ad) for (a,b), (c,d) $\in$ A. Then find Invertible elements of A, and hence write the inverse of elements (5,3) and $\left(\frac{1}{2}, 4\right)$

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87. Let $A = R \times R$ and * $A \times A \rightarrow A$ be defined as (a,b) * (c,d) = (ac-bd,ad+bc) for all (a,b), (c,d) $\in$ A. Find the identity element of A w.r.t. '*' and invertible elements of A.

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88. Number of binary operations on the set {a, b} is

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Exercise

1. Let A = (a,b,c) and R be the relation defined on A as follows R = (a,a), (b,c), (a,b) Write minimum number of ordered pairs to be added to R to make R reflexive and transitive.

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2. Let A = (6,7,8,10), B = (2,4,5) a $\in$ A , b $\in$ B and R be the relation form A to B defined by a R b iff a is divisible by b. Write the solution of R and find the inverse relation of R.

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3. For the given relation R on a set S, determine which are equivalence relations : (i) S is the set of all rational numbers a R b iff a= b. (ii) S is the set of all real numbers iff : (I) $|a| = |b|$ (II) $a \geq b$.

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4. For the given relation R on a set S, determine which are equivalence relations : (i) S is the set of all rational numbers a R b iff a= b. (ii) S is the set of all real numbers iff : (I) $|a| = |b|$ (II) $a \geq b$.

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5. For the given relation R on a set S, determine which are equivalence relations : (i) S is the set of all rational numbers a R b iff a= b. (ii) S is the set of all real numbers iff : (I) $|a| = |b|$ (II) $a \geq b$.

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6. In the following cases, for the given relation R on the set S, determine which are equivalence relations:

S is the set of all people in the world today, a R b $\Leftrightarrow$ a and b have same father.

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7. In the following cases, for the given relation R on the set S, determine which are equivalence relations:

S is the set of all people in the world today, a R b iff a lives within 100 kilometres f b.

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8. For the given relation R on a set S, determine which are equivalence relations : (i) S is the set of all rational numbers a R b iff a= b. (ii) S is the set of all real numbers iff : (I) $|a| = |b|$ (II) $a \geq b$.

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9. Check whether the relation R defined in the set (1, 2, 3, 4, 5, 6) as R= {(a, b) : b = a +1)} is reflexive, symmetric or transitive ?

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10. Show that $R = \{(a, b) : a \geq b\}$ is reflexive and transitive but not symmetric.

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11. Let A be the set of human beings living in a town at a particular time and R be the relation on A defined by R = (x,y) : x is exactly 7 cm taller than y). Check whether the relation R is reflexive, symmetric or transitive on A.

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12. Given the relation R = {(1, 2), (2, 3)} on the set of natural numbers, add a minimum of ordered pairs so that the enlarged relation is symmetric, transitive and reflexive.

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13. Show that each of the relation R in the set A =$\{x \in z : 0 \leq x \leq 12\}$, given by

R = {(a,b) : |a-b| is a multiple of 4} is an equivalec relation. Find the set of all elements related to 1 in each case.

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14. Show that each of the relation R in the set $A = \{x \in Z : 0 \leq x \leq 12\}$, given by: $R = \{(a, b) : a = b\}$, is an equivalence relation. Find the set of all elements related to 1 in each case.

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15. Is inclusion of a subset in another, in the context of a universal set, an equivalence relation in the class of subsets of the sets ? Justify your answer.

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16. If R is a relation in $N \times N$, show that the relation R defined by (a, b) R (c, d) if and only if ad = bc is an equivalence relation.

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17. If R is the relation in $N \times N$ defined by (a, b) R (c,d) if and only if (a + d) =(b + c), show that R is an equivalence relation.

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18. Show that the relation R defined by

$(a, b)R(c, d) \Rightarrow a + d = b + c$ in the set N is an equivalence relation.

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19. Each of the following defines a relation R in N.

x R y if xy is square of an integer, x y $\in$ N. Determine in each ase, whetehr R is reflexive, symetric or transitive.

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20. Each of the following defines a relation R in N.

x R y if xy is square of an integer, x y $\in$ N. Determine in each ase, whetehr R is reflexive, symetric or transitive.

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x R y if xy is square of an integer, x y $\in$ N. Determine in each ase, whetehr R is reflexive, symetric or transitive.

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22. Each of the following defines a relation R in N.

x R y if xy is square of an integer, x y $\in$ N. Determine in each ase, whetehr R is reflexive, symetric or transitive.

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23. Let R_1 and R_2 be two relations defined on a non-empty set A. Which of the following statements is false? Give reason in support of your answer.

If R_1 and R_2 are reflexive, then so is $R_! NnR_2$.

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24. Let R and S be two non-void relations on a set A. Which of the following statement is false?

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25. Let R and S be two non-void relations on a set A. Which of the following statement is false?

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26. Let R and S be two non-void relations on a set A. Which of the following statement is false?

Watch Video Solution

27. Let R_1 and R_2 be two relations defined on a non-empty set A. Which of the following statements is false? Give reason in support of your answer.

If R_1 and R_2 are reflexive, then so is $R_! NnR_2$.

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28. Let $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$. Let R_1 be a relation in X given by $R_1 = \{(x, y) : x - y$ is divisible by 3} and R_2 $bea \neg herrelationonX givenby$R_2 = {(x, y): {x, y} sub {1, 4, 7} or {x, y} sub {2, 5, 8} or {(x, y} sub {3, 6, 9}. $Showt$^R_1 = R_2`.

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29. Let A = {1,2,3}. Then show that the nmber of relations (1,2) and (2,3), whch are reflexive and transitive but not symmetric, is four.

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30. Which of the following relations are functions form A = (1,3,5,7,9) to B = (1,2,3,4,5).

f= ((3,1), (5,1), (7,1), (9,1))

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31. Which of the following are the functions of RNA?

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32. Which of the following functions are odd or even or neither :

$f(x) = |x| + 1$

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33. Which of the following are the functions of RNA?

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34. Which of the following functions are not derivable at $x = 0$?

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35. Correct the following statement , "Every function is a relation is a relation and every relation is a function"

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36. Give an example of a function which is one-one but not onto

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37. Give an example of a function which is one-one but not onto

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38. Give an example of a function which is one-one but not onto

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39. If X = {a,b,c,d} and Y = {f,b,d,g}, find X-Y and Y-X.

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40. Let x = (a,b,c) and Y = (0,1,2,3,4,5), define a one-one function from X to Y. does there exist an onto function form X to Y? If not, give reason.

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41. Prove that the function $f: N \rightarrow N$ defined by $f(x) = x^2 + x + 1$ is one -one but not onto.

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42. Let f, X $\rightarrow$ Y be defined by f(x) = $x^2 + 1$, for all x $\in$ X where X = (0,1,2,-2) and Y = (0,1,2,3,4,5). Find the range of f. Is f one-one?

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43. Which of the following functions are one-one?

f(x) = 3x + 2

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44. Which of the following functions are one-one?

$f(x) = 2x^2 + 3$

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45. Which of the following functions are one-one?

$$f(x) = \frac{1}{3x - 4}$$

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46. Whether the following functions is one-one?

$$f(x) = \frac{1}{x^2} + 1$$

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47. Whether the following functions are one-one?

$$f(x) = x + \frac{1}{x}$$

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48. Let A = (-1,1). In each of the following cases, check whether f, A $\rightarrow$ A is one-one or onto or both.

$$f(x) = \frac{x}{2}$$

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49. Whether the following functions are one-one?

$$f(x) = |x|$$

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50. Whether the following functions are one-one?

$$f(x) = x|x|$$

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51. Whether the following functions are one-one?

$f(x) = x^2$

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52. Let f : $X \rightarrow Y$ be defie by f(x) $= x^2$ for all x $\in$ X where X = (-2,-1,0,1,2,3) and Y = (0,1,4,5,9,10). If A = (-1,0,2,3) and B = (0,1,2,3). Verify that $f(A \cup B) = f(A) \cup f(B)$

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53. Let f : $X \rightarrow Y$ be defie by f(x $= x^2$ for all x $\in$ X where X = (-2,-1,0,1,2,3) and Y = (0,1,4,5,9,10). If A = (-1,0,2,3) and B = (0,1,2,3). Verify that $f(A \cap B) \neq f(A) \cap f(B)$

Watch Video Solution

54. Let f : $X \rightarrow Y$ be defie by f(x $= x^2$ for all x $\in$ X where X = (-2,-1,0,1,2,3) and Y = (0,1,4,5,9,10). If A = (-1,0,2,3) and B = (0,1,2,3). Verify that $f(A - B) \neq f(A) - f(B)$

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55. Let f : $N \rightarrow N$ be defined by f (X) = x + 3 for all x $\in$ N, obtain $f^{-1}(1, 2, 3,)$

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56. If f = (5,2),(6,3), g = (2,5),(3,6), write fog.

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57. Let $f : R \rightarrow R$ be defined by f (x) $= x^2 - 3x + 4$ for all x $\in$ R , then f^{-1} (2) is equal to

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58. If $f(x)$= $(a-x^n)^{1/n}$ prove that $f(f(x))=x$

Watch Video Solution

59. If f(X) = $\frac{ax-b}{bx-a}$, show that f(f(x)) $=x$

Watch Video Solution

60. If f(x) = $\frac{1}{1-x}$, show that f(f(x)) = x

Watch Video Solution

61. If $f: R \rightarrow R$ be given by: $f(x) = \left(3-x^3\right)^1/3$, then f(f(x)) is:

Watch Video Solution

62. Let A = (1,2,3,5), let f = f = (1,5), (2,1), (3,3), (5,2) and $g = (1, 3), (2, 1), (3, 2), (5, 5)$ find gof

Watch Video Solution

63. Let A = (1,2,3,5), let f = f = (1,5), (2,1), (3,3), (5,2) and $g = (1, 3), (2, 1), (3, 2), (5, 5)$ find fog

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64. Let A = (1,2,3,5), let f = f = (1,5), (2,1), (3,3), (5,2)) and $g = \begin{pmatrix} 1 & 3 \\ 2 & 1 \\ 3 & 2 \\ 5 & 5 \end{pmatrix}$ find fof

Watch Video Solution

65. Let A = (1,2,3,5), let f = f = (1,5), (2,1), (3,3), (5,2)) and $g = \begin{pmatrix} 1 & 3 \\ 2 & 1 \\ 3 & 2 \\ 5 & 5 \end{pmatrix}$ find gog

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66. Let f(X) = 3-4 x for all x $\in$ R. Find g : $R \rightarrow R$ such that gof = 1_R=fog

Watch Video Solution

67. Let f : $R \rightarrow R$ be defined as f(x) = 7x - 3. Find the function g : $R \rightarrow R$ such that fog = gof = 1_R,

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68. if f(x) = |x+1| and g(X) = $3x^2 - 2$, then find formulae for the functions fog

Watch Video Solution

69. if f(x) = |x+1| and g(X) = $3x^2 - 2$, then find formulae for the functions

gof

Watch Video Solution

70. if f(x) = |x+1| and g(X) = $3x^2 - 2$, then find formulae for the functions

fof

Watch Video Solution

71. if f(x) = |x+1| and g(X) = $3x^2 - 2$, then find formulae for the functions

gog

Watch Video Solution

72. If f(x) = sin x and g (X) = 3x. Describe gof and fog. Are these functions equal ?

Watch Video Solution

73. If f(x) = sin x and g (X) = 3x. Describe fog. Are these functions equal ?

Watch Video Solution

74. If f(x) = 2x + 3 and g (X) $= x^2$ + 1, describe the functions fog Also show that $fof \neq ff$

Watch Video Solution

75. If f(x) = 2x + 3 and g (X) $= x^2$ + 1, describe the functions gof Also show that $gof \neq gf$

Watch Video Solution

76. If f(x) = 2x + 3 and g (X) $= x^2$ + 1, describe the functions fof Also show that $fof \neq ff$

Watch Video Solution

77. If f(x) = 2x + 3 and g (X) $= x^2$ + 1, describe the functions ff. Also show that $fof \neq ff$

Watch Video Solution

78. Consider $f: N \to N, g: N \to N$ and $h: N \to R$ defined as $f(x) = 2x$, $g(y) = 3y + 4$ and $h(z) = \sin z, \forall x, y \text{ and } z$ Show that $ho(gof) = (hog)of.$

Watch Video Solution

79. Consider

$f:(1, 2, 3) \rightarrow (a, b, c)$ and $g:(a, , c) \rightarrow (app \leq , ball, cat)def \in edasf(1)$

(gof)

Watch Video Solution

80. Explain why the following functions f : $X \rightarrow Y$ do not have inverses:

X = Q - (0), Y = Q and f(x) = $\frac{1}{X}$ for all x $\in$ X.

Watch Video Solution

81. Explain why the following functions f : $X \rightarrow Y$ do not have inverses:

X = (1,2,3,4,5), Y = (0,1) and f(X) = 0 for x = 1,2,3,4 and f(5) = 1

Watch Video Solution

82. Explain why the following functions f : $X \to Y$ do not have inverses:

X= R = Y and f (X) =x^2 for all x $\in$ R.

Watch Video Solution

83. Explain why the following functions f : $X \to Y$ do not have inverses:

X= R = Y and f (X) =x^2 for all x $\in$ R.

Watch Video Solution

84. If A = (a,b,c,d) and f corresponds to the subset (a,b),(b,d),(c,a),(d,c) of the cartesian product $A \times A$. Show that f is a bijection and find f^{-1}

Watch Video Solution

85. Let f : $Z \to Z$ be defined as f(n) = 3n for all $n \in Z$. Let g : $Z \to Z$ be defined as g(n)= $\frac{n}{3}$ if n is a multiple of 3.

g(n)= 0 if n is not a multiple of 3. Show that gof = I_z and $fog \neq I_Z$

Watch Video Solution

86. Let $f: R \rightarrow R$ be defined by $f(x) = \frac{1}{x} \forall x \in R$, then f is

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87. Let $f: N \rightarrow N$ be defined by, $f(n) = \begin{cases} \frac{n+1}{2} & \text{if } \ nisodd \\ \frac{n}{2} & \text{if } \ niseven \end{cases}$ for all $n \in N$. State whether the function f is bijective. Justify your answer.

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88. Lert $f: X \rightarrow Y$ be such that fof = f. Show that f is onto if and only if f is one-one.

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89. Let $f: X \rightarrow Y$ be an invertible function. Show that f has unique inverse.

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90. Let A be any non-empty set and f be a bijection on A, prove that $f^{-1}of = I_A = fof^{-1}$ where I_A is the identity map on A.

Watch Video Solution

91. Let A be any non-empty set and f be a bijection on A, prove that $f^{-1}of = I_A = fof^{-1}$ where I_A is the identity map on A.

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92. Let f : A $\rightarrow$ B and g : B $\rightarrow$ C be onto functions, show that gof is an onto function.

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93. Consider $f: R \to [-5, \infty]$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible with $f^{-1}(y) = \left[\frac{\sqrt{y+6} - 1}{3}\right]$

Watch Video Solution

94. Consider $f: R_+ \to (-9, \infty)$given by $f(x) = 5x^2 + 6x - 9$. Prove that f is invertible with $f^{-1}(y) = \frac{\sqrt{54 + 5y} - 3}{5}$

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95. Let $f: R \to R$ be the signum function defined as $f(x) = \begin{cases} 1 & x > 0 \\ 0 & x = 0 \\ -1 & x < 0 \end{cases}$ and $g: R \to R$ be the greatest integer function given by $g(x) = [x]$ where [x] is greatest integer less than or equal to x. Then, does fog and gof coincide in (0,1] ?

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Watch Video Solution

96. Let $f: R \to R$ be defined as f(X) = 3x. Then

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97. Consider the function $f(x) = \frac{1-x}{1+x}$. Is f one-one? If yes, find f^{-1}

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98. If $f: R \to R$ is defined by $f(x) = x^2 - 3x + 2$, find $f(f(x))$.

Watch Video Solution

99. If $f: R \to R$ is defined by $f(x) = x^2 - 3x + 2$, find $f(f(x))$.

Watch Video Solution

100. If $f: R \to R$ is defined by $f(x) = x^2 - 3x + 2$, find $f(f(x))$.

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101. Show that $\cdot : R \times R \to R, givenby(a, b) \to a + 4b^2$ is a binary operation.

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102. Let a mapping '*' from $R \times R$ to R be defined by a * b = 2 a + 2 b for all a , b $\in$ Z. Prove that the givne operation is commutative but not associative.

Watch Video Solution

103. Let a binary operation '*' be defined on Z by a * b = 2 a + 2b for all a, b $\in$ Z. Prove that the given operawtion is commutative but not associative.

Watch Video Solution

104. Let S be the set of all real numbers except 1 and 'o' be an operation on S defined by : aob = a+b - ab for all a,b $\in$ S. Prove that the given operation is : (I) commutative (II) associative.

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105. Let S be the set of all real numbers except 1 and 'o' be an operation on S defined by : aob = a+b - ab for all a,b $\in$ S. Prove that S is closed under given operation.

Watch Video Solution

106. Let S be the set of all real numbers except 1 and 'o' be an operation on S defined by : aob = a+b - ab for all a,b $\in$ S. Prove that the given operation is : (I) commutative (II) associative.

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Watch Video Solution

107. Let S be the set of all real numbers except 1 and 'o' be an operation on S defined by : aob = a+b - ab for all a,b $\in$ S. Prove that S is closed under given operation.

Watch Video Solution

108. Let S be the set of all real numbers except 1 and 'o' be an operation on S defined by : aob = a+b - ab for all a,b $\in$ S. Prove that S is closed under given operation.

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109. Consider the operations '*' and $\oplus$ on the set R of all real numbers defined as a* b = |a-b| and a $\oplus$ b = a for all a, b $\in$ R.

Prove that '*' is commutative but not associative.

Watch Video Solution

110. Consider the operations '*' and $\oplus$ on the set R of all real numbers defined as a* b = |a-b| and a $\oplus$ b = a for all a, b $\in$ R.

Prove that $\oplus$ is associative but n ot commutative.

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111. Consider the operations '*' and $\oplus$ on the set R of all real numbers defined as a* b = |a-b| and a $\oplus$ b = a for all a, b $\in$ R.

Prove that $\oplus$ is associative but n ot commutative.

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112. Let $A = Q \times Q, Q$ being the set of rationals. Let '*' be a binary operation on A, defined by (a,b) * (c,d) = (ac,ad+b). Show that '*' is not commutative.

Watch Video Solution

113. Let $A = Q \times Q, Q$ being the set of rationals. Let '*' be a binary operation on A, defined by (a,b) * (c,d) = (ac,ad+b). Show that '*' is associative.

Watch Video Solution

114. Let $A = N \times N$ being the set of natural numbers. Let '*' be a binary operation on A defined by `(a,b) * (c,d) = (a+c,b+d). Show that '*' is commutative.

Watch Video Solution

115. Let $A = N \times N$ being the set of natural numbers. Let '*' be a binary operation on A defined by `(a,b) * (c,d) = (a+c,b+d). Show that '*' is associative.

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116. Let $A = N \times N$ being the set of natural numbers. Let '*' be a binary operation on A defined by `(a,b) * (c,d) = (a+c,b+d). Show that identity element w.r.t '*' does not exist.

Watch Video Solution

117. Let $A = R \times R$ and * be a binary operation on A defined by : (a,b) * (c,d) = (A+c,b+d)

$. Showt \hat{\cdot} iscom\mu tative$ and $associative. F \in dtheidentitye \leq mentf$ or in`A.

Watch Video Solution

118. Let $A = Q \times Q$. Let'*' be a binary operation on A defined by: (a, b) * (c, d)= (ac, ad + b). Find the identity element of A

Watch Video Solution

119. Let $A = Q \times Q$. Let'*' be a binary operation on A defined by: (a, b) * (c, d)= (ac, ad + b). Find the identity element of A

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120. If the operation * defined by a* b =a^2 + b^2 or all real numbers a and b, then (2*3) * 4 =

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121. Let $* : Q \times Q \to Q$ be defined a as a * b = 1 + ab for all a, b $\in$ Q. Show that * is commutative but not associative.

Watch Video Solution

122. Let '*' be a binary operation on Q defined by a * b = (3ab)/5. Show that * is commutative as well as associative. Also, find its identity element, if it exists.

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123. Define a binary operation * on the set {0,1,2,3,4,5} as

$a \cdot b = \begin{cases} a+b & \text{if } a+b<6 \\ a+b-6 & \text{if } a+b \geq 6 \end{cases}$ Show that zero is the identity for this operation and each element $a \neq 0$ of the set is invertible with 6 - a being the inverse of a.

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124. Let N^m be the set of al ordered m-tuples of natral numbers. If x = $(x_1 . x_2 . \dots . . x_m)$ y = $(y_1, y_2 . \dots . y_m)$ where $x_i, y_i, \in N, I = 1, 2 \dots m$ and an operation '+' is defined on N^m by $x + y = (x_1 + y_1 . x_2 + y_2, \dots . . x_m + y_m)$ then prove that given operation is commutative as well as associative.

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125. Let A be a non-empty set and '*' be a binary operation on P(A), the power set of A, defind by X*Y = $X \cup Y$ for all X, Y $\in$ P(A) find the identity element w.r.t. '*'

Watch Video Solution

126. Let A be a non-empty set and '*' be a binary operation on P(A), the power set of A, defind by X*Y = $X \cup Y$ for all X, Y $\in$ P(A) Show that $\phi \in$ P (A) is only invertible element w.r.t '*'

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127. Let A = (1,2,3) and B = (a,b). How many relations can be defined form A to B?

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128. If R = (1,3),(2,1) is a relation on the set A = (1,2,3), find R^{-1}

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129. Write the domain of the relation R (a,a),(a,b),(a,c) defined on the set (a,b,c)

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130. Write down the range of the relation R = (1,1), (1,2), (3,2), (4,2)` defined on the set (1,2,3,4)

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131. Given set A = {1,2,3}, then the relation : R = {(1,1),(2,2),(3,3)} is reflexive. (True/False)

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132. Is the relation R = (a,a), (a,b), (b,b). Transitive on the set A = (a,b,c)?

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133. Write down the identity relation on the set A = (x,y,z)

Watch Video Solution

134. If $A = \{a, b, c, d\}$ then a relation $R = \{(a, a), (b, b), (c, c), (d, d)\}$ on A is :

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135. Is the relation R = (1,1), (2,2), (3,3) transitive on the set A = (1,2,3)?

Watch Video Solution

136. Write the domain of the relation R (a,a),(a,b),(a,c) defined on the set (a,b,c)

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137. Let A = (1,2,3). For x,y $\in$ A, let x R y iff x < y. Write down R as a subset of $A \times A$.

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138. Write the smallest reflexive relation on the set A = (a,b)

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139. Let A = {0, 1, 2, 3} and define a relation R on A as follows :

$R = \{(0, 0), (0, 1), (0, 3), (1, 0), (1, 1), (2, 2), (3, 0), (3, 3)\}$

Is R reflexive ? symmetric ? transitive ?

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140. Let A = {0, 1, 2, 3} and define a relation R on A as follows :

$R = \{(0, 0), (0, 1), (0, 3), (1, 0), (1, 1), (2, 2), (3, 0), (3, 3)\}$

Is R reflexive ? symmetric ? transitive ?

Watch Video Solution

141. Let A = {0, 1, 2, 3} and define a relation R on A as follows :

$R = \{(0, 0), (0, 1), (0, 3), (1, 0), (1, 1), (2, 2), (3, 0), (3, 3)\}$

Is R reflexive ? symmetric ? transitive ?

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142. For the set A = (1,2,3) define a relation R on the set A as follows:

$R = (1, 1), (2, 2), (3, 3), (1, 3)$. Write the ordered paris to be added to R to make it the smallest equivalence relation.

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143. Write the number of symmetric relations that can be defined on the set {0}

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144. State the reason for the relation R, in the set {1,2,3} given by R= {(1,2), (2, 1), not to be transitive.

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145. If $R = \{(x, y) : x + 2y = 8\}$ is a relation on N write the range of R

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146. If R = (x,y) , xy = 12 is a relation on N, write the domain of R.

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147. Show that -a is not the inverse of $a \in N$ for the addition operation $' + '$ on N and $\frac{1}{a}$ is not the inverse of $a \in N$ for multiplication operation ' $\times$ 'on N , for $a \neq 1$.

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148. Let R be a relation from a set A to a set B, then:

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149. What is the set builder form of the set {1,2,3}.

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150. The number of relations that can be defined on the set {x,y,z} is:

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151. A vertical line meets the graph of a function in:

Watch Video Solution

152. If f = (1.4), (2,5), (3,5) and g = (4,6),(5,6) be two function then find the function fog.

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153. The number of bijective functions from the set A to itsef, if A contains 108 elements is

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154. What is the domain of the function $f(X) = \frac{1}{x-1}$?

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155. if 'f' is the function form R to R defined by the rule $f(x) = x^2 - 3x + 2$ then find f^{-1} (0)

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156. Consider the function $f(x) = x^2$ defined on R. find the set $f^{-1}(1, -1, -4)$

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157. In order that a relation R defined on a non-empty set A is an equivalence relation. It is sufficient, if R

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158. If $f(x) = \frac{x-2}{x-3}, x \neq 3$, Examine whether $f(x)$ is invertible or not. If $f(x)$ is invertible, then find $f^{-1}(x)$.

Watch Video Solution

159. In order that a relation R defined on a non-empty set A is an equivalence relation. It is sufficient, if R

Watch Video Solution

160. A vertical line meets the graph of a function in:

Watch Video Solution

161. What is the range of the signum function?

Watch Video Solution

162. if f(x) = |x+1| and g(X) = $3x^2 - 2$, then find formulae for the functions fog

Watch Video Solution

163. Function f : R $\rightarrow R$ f(x) = 3 x -5 is

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164. If $f(x) = x^2$, find $\dfrac{f(1.1) - f(1)}{(1.1 - 1)}$.

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165. Consider the function $f: R - (-1) \rightarrow R - (-1)$ defined by the rule $f(x) = \dfrac{1 - x}{1 + x}$. Find f^{-1} (x)

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166. Write down the domain of the function f defined by f(x) $= \sqrt{25 - x^2}$

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167. If A = (a,b,c,d) and f corresponds to the subset (a,b),(b,d),(c,a),(d,c) of the cartesian product $A \times A$. Show that f is a bijection and find f^{-1}

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168. If $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is a function described by the formula g(x) = $\alpha x + \beta$, what values should be assigned to α and β?

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169. Prove that:

$$\begin{vmatrix} a^2 & a & b+c \\ b^2 & b & c+a \\ c^2 & c & ab \end{vmatrix} = -(a+b+c)(a-b)(b-c)(c-a)$$

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170. Let $f: R \to R$ be defined by $f(x) = \frac{1}{x} \forall x \in R$, then f is

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171. If $f: R \to R$ is defined by $f(x) = x^2 - 3x + 2$, find f(f(x)).

Watch Video Solution

172. If f. g : $R \to R$ are defined respectively as f(X) = 2x + 1 and g (x) = $x^2 - 2$ for all x $\in$ R, then find gof.

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173. Are the following sets of ordered pairs functions? (x,y) : x is a person , y is mother of x

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174. Are the following sets of ordered pairs functions? (a,b), a is a person, b is an ancestor of a

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175. If $f(x) = x + 7 \text{ and } g(x) = x - 7, x \in R$ find (fog) (7).

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176. The range of function $f(x) = \frac{|x - 1|}{x - 1}$

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177. Let A = {1, 2, 3}, B = {4, 5, 6, 7} and let f = {(1, 4), (2, 5), (3, 6)} be a function from A to B. Show that f is one-one.

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178. If $f(x) = x^2$ and $g(x) = 2x + 3$, then the laue of gof (-1) is

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179. If $f(x) = \frac{x+1}{x+2}$ and $g(x) = x^2$, then find fog

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180. Let f(x) = x^2 and g (x) = $\sqrt{x}$, then (fog) (x) = x for all x $\in D_{fog}$. Write

`D_(fog)~

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181. Let '*' be the binary operation defined on N by the rule a * b = 3 a + 4 b - 2. Find 4 * 3.

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182. Is the binary operation '*' defined on Z (set of integers) by the rule m*n = m - n for all m , n $\in$ Z commutative?

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183. Let '*' be the operation defined on the set Z of integers by the rule a*b=a +b + 1 for all a , b $\in$ Z, write down the identity element for this operation.

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184. Let '*' be the binary operation defined on Q by the rule a * b = ab^2 for a , b $\in$ Q. compute (1*2) *3.

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185. Let '*' be the binary operaton on the set (1,2) defined by the following table.

*	1	2
1	1	2
2	2	1

Write down the identity element, Also write the inverse of 2.

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186. Let '*' be the binary operation defined on the set R - (0) by the rule a * b = $\frac{ab}{3}$ for all a, b $\in$ R - (0). Find $\left(2^{-1}\right)$

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187. Let '*' be the operation defined on the set R - (0) by the rule a * b = $\frac{ab}{5}$ for all a, b $\in$ R - (0). Write the identity element for this operation.

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188. Let '*' be the binary operation defined on Q by the rule a * b = $\frac{ab}{4}$ for all a , b $\in$ Q . Is the operaiton * associative?

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189. Write the domain of the relation R (a,a),(a,b),(a,c) defined on the set (a,b,c)

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190. Find the multiplication of 95×0

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191. The number of relations that can be defined on the set {x,y,z} is:

Watch Video Solution

192. Write down the number of commutaive binary operations that can be defined on the set (1,2).

Watch Video Solution

193. Let '*' be a binary operation on N given by a* b = LCM (a,b) for all a , b $\in$ N . Find 5 * 7.

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194. The binary operation $* : R \times R \to R$ is defined as $a * b = 2a + b$. Find $(2 * 3) * 4$

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195. Let $*$ be a binary operation on the set of all non-zero real numbers, given by $a * b = \frac{ab}{5}$ for all $a, b \in R - \{0\}$. Find the value of x, given that $2 * (x * 5) = 10$

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196. Let '*' be the binary operaton on the set (1,2) defined by the following table.

*	1	2
1	1	2
2	2	1

Write down the identity element, Also write the inverse of 2.

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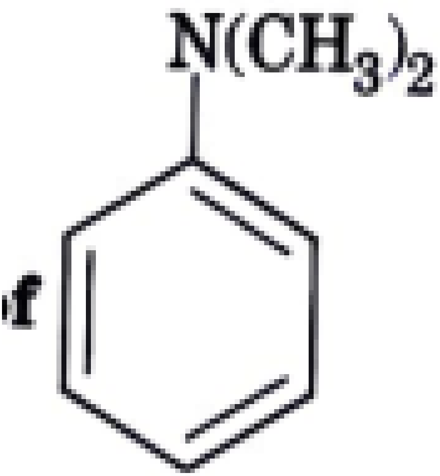
197. Write down the IUPAC name of



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198. Determine whether each of the following relations are reflexive, symmetric and transitive:

Relation R in the set A = {1,2,3,....,13,14}] defined as R = {(x,y):3x-y=0).

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199. Determine whether each of the following relations are reflexive, symmetric and transitive:

Relation R in the set N of natural numbers defined as : R = (x,y), y = x+5 and x < 4)

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200. Determine whether each of the following relations are reflexive, symmetric and transitive:

Relation R in the set A = (1,2,3,4,5,6) as R = (x,y), y is divisible by x.

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201. Determine whether each of the following relations are reflexive, symetric and transitive

Relation R in the set Z of all integers defined as R = (x,y) : x-y is an integer.

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202. Determine whether the following relations are reflexive, symmetric and transitive: Relation R in the set A of human beings in a town at a particular time given by, R = {(x, y) : x and y work at the same place}

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203. Determine whether the following relation is reflexive, symmetric and transitive:

Relation R in the set A of human beings in a town at a particular time given by

R = (x,y): x and y live in the same locality.

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204. Determine whether the following relations are reflexive, symmetric and transitive:Relation R in the set A of human beings in a town at a particular time given by, R = {(x, y) : x is exactly 7 cm taller than y}

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205. Determine whether each of the following relations are reflexive, symmetric and transitive:

Relation R in the set A of human beings in a town at a particular time given by :

R = (x,y): x is wife of y

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206. Show that the relation R in the set R given by, `R = {(a, b): a≤b^2} neither reflexive nor symmetric nor transitive.

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207. Check whether the relation R defined in the set (1, 2, 3, 4, 5, 6) as R= {(a, b) : b = a +1)} is reflexive, symmetric or transitive ?

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208. The relation R in R defined as $R = \{(a, b) : a \leq b\}$, is reflexive and transitive but not symmetric.

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209. Check whether the relation R in R, defined by $R = \{(a, b) : a \leq b^3$) is reflexive, symmetric or transitive ?

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210. Show that the relation R in the set {1,2,3} given by R = {(1,2),(2,1)} is symmetric but neither reflexive nor transitive.

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211. Show that the relation R in the set A of all the books in a library of a college, given by R = {(x, y): x andy have same number of pages} is an equivalence, relation.

Watch Video Solution

212. Show that each of the relation R in the set A =$\{x \in z : 0 \leq x \leq 12\}$, given by

R = {(a,b) : |a-b| is a multiple of 4} is an equivalec relation. Find the set of all elements related to 1 in each case.

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213. Show that each of the relation R in the set $A = \{x \in Z : 0 \leq x \leq 12\}$, given by: $R = \{(a, b) : a = b\}$, is an equivalence relation. Find the set of all elements related to 1 in each case.

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214. Give an example of a relation. Which is: Symmetric but neither reflexive nor transitive.

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215. Give an example of relation which is

Transitive but niether reflexive nor symmetric.

Watch Video Solution

216. Give an example of a relation which is reflextive and symmetric but not transitive.

Watch Video Solution

217. Give an example of relation which is

Reflexive and transitive but not symmetric

Watch Video Solution

218. Give an example of a relation which is symmetric and transitive but not reflexive.

Watch Video Solution

219. Show that the relation R in the set A of points in a plane given by R = {(P, Q) : distance of the point P from the origin is same as the distance of the point Q from the origin}, is an equivalence relation. Further, show that the set of all points related to a point $P \neq (0, 0)$ is the circle passing through P with origin as centre.

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220. Show that the relation R, defined by the set A of all triangles as : $R = \{(T_1, T_2) = T_1$ is similar to T_2}` is an equivalence relation. Consider three right-angled triangles T_1 with sides 3, 4, 5, T_2 with sides 5, 12, 1 3 and T_3 with sides 6, 8, 10.

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221. Show that the relation R defined in the set A of all polygons as $R = \{(P1, P2) : P1 \text{ and } P2$ have same number of sides}`, is an equivalence relation. What is the set of all elements in A related to the right angle triangle T with sides 3, 4 and 5?

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222. Let L be the set of all lines in XY plane and R be the relation in L defined as $R = \{(L_1, L_2) : L_1$ is parallel to L_2)}. Show that R is an equivalence relation. Find the set of all lines related to the line y = 2x + 4.

Watch Video Solution

223. Let R be the relation in the set {1, 2, 3, 4} given by R = {(1, 2), (2, 2), (1, 1), (4,4), (1, 3), (3, 3), (3, 2)}. Choose the correct answer.

A. R is reflexive and symmetric but not transitive

B. R is reflexive and transitive but not symmetric

C. R is symmetric and transitive but not reflexive

D. R is an equivalence relation.

Answer:

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224. Let R be the relation in the set N given by $R = \{(a, b) : a = b - 2, b > 6\}$. Choose the correct answer:

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

B. $(3.8) \in R$

C. $(6, 8) \in R$

D. $(8, 7) \in R$

Answer:

Watch Video Solution

225. Show that the function $f: R_{.} \rightarrow R_{.}$ defined by $f(x) = \frac{1}{x}$ is one-one and onto, where $R_{.}$ is the set of all non-zero real numbers. Is the result true, if the domain $R_{.}$ is replaced by N with co-domain being same as $R_{.}$?

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226. Check the injectivity and surjectivity of the following function: $f: N \rightarrow N$ given by $f(x) = x^2$

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227. Check the injectivity and surjectivity of the following function: $f: Z \rightarrow Z$ given by $f(x) = x^2$

Watch Video Solution

228. Check the injectivity and surjectivity of the following function: $f: R \rightarrow R$ given by $f(x) = x^2$

Watch Video Solution

229. Check the injectivity and surjectivity of the following function: $f: N \rightarrow N$ given by $f(x) = x^3$

Watch Video Solution

230. Check the injectivity and surjectivity of the following function: $f: Z \rightarrow Z$ given by $f(x) = x^3$

Watch Video Solution

231. Check the injectivity and surjectivity of the following function: $f: R \to R$ given by $f(x) = x^3$

Watch Video Solution

232. Prove that greatest integer function $f: R \to R$, given by $f(x) = [x]$, is neither one-one nor onto where [x] denotes the greatest integer less than or equal to x .

Watch Video Solution

233. Prove that Modulus Function $f: R \to R$ given by : $f(x) = |x|$ is neither one-one nor onto, where $|x|$ is x, if x is positive and $|x|$ is - x, if x is negative.

Watch Video Solution

234. Show that the signum function $f: R \rightarrow R$ given by:

$$f(x) = \begin{cases} 1 & \text{if} \quad x > 0 \\ 0 & \text{if} \quad x = 0 \\ -1 & \text{if} \quad x < 0 \end{cases}$$ is neither one-one nor onto.

Watch Video Solution

235. Let A = {1, 2, 3}, B = {4, 5, 6, 7} and let f = {(1, 4), (2, 5), (3, 6)} be a function from A to B. Show that f is one-one.

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236. In the following case, state whether the function is one-one, onto or bijective. Justify your answer: $f: R \rightarrow R$ defined by $f(x) = 3 - 4x$

Watch Video Solution

237. In the following case, state whether the function is one-one, onto or bijective. Justify your answer: $f: R \rightarrow R$ defined by $f(x) = 1 + x^2$

Watch Video Solution

238. Let A and B be sets, show that $f: A \times B \rightarrow B \times A$ such that f(a,b) = (b,a) is a bijective function.

Watch Video Solution

239. Let $f: N \rightarrow N$ be defined by :

$f(n) = \begin{cases} \frac{n+1}{2} & \text{if} \quad n is odd \\ \frac{n}{2} & \text{if} \quad n is even \end{cases}$ then f is

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240. Let $A = R - \{3\}$ and $B = R - \{1\}$. Consider the function $f: A \rightarrow B$ defined by $f(x) = \left(\frac{x-2}{x-3}\right)$. Is f one-one and onto? Justify your answer.

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

A. f is one-one onto

B. f is many-oe onto

C. f is one-one but not onto

D. f is neither one-one nor onto.

Answer:

Watch Video Solution

242. Let $f: R \rightarrow R$ be defined by $f(x) = x^2 + 1$ Find the pre-image of 17

A. f is one-one onto

B. f is many-one onto

C. f is one-one but not onto

D. f is neither one-one nor onto.

Answer:

Watch Video Solution

243. If f:(1,3,4} $\rightarrow$ {1, 2,5} and g:(1,2,5) {1,3} be given by f = {(1, 2), (3,5),(4, 1)} and g: {(1,3), (2, 3), (5, 1)}, write down gof.

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244. Let f,g and h be function from R to R. Show that (f+g) o h = foh + goh

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245. Find gof and fog, if f (x) = |x| and g (x) = 15 x - 21

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246. Find gof and fog, if $f(x) = 8x^3$ and $g(x) = x^{\frac{1}{3}}$

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247. If $f(x) = \frac{4x+3}{6x-4}, x \neq \frac{2}{3}$, show that (fof) (x) = x for all $\neq \frac{2}{3}$. What is inverse of 'f' ?

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248. State with reason whether following functions have inverse: $f: \{1, 2, 3, 4\} \rightarrow \{10\}$ with $f = \{(1, 10), (2, 10), (3, 10), (4, 10)\}$

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249. State with reason whether following functions have inverse: $g: \{5, 6, 7, 8\} \rightarrow \{1, 2, 3, 4\}$ with $g = \{(5, 4), (6, 3), (7, 4), (8, 2)\}$

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250. State with reason whether following functions have inverse: $h:\{2, 3, 4, 5\} \rightarrow \{7, 9, 11, 13\}$ with $f = \{(2, 7), (3, 9), (4, 11), (5, 13)\}$

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251. Show that f: [-1, 1], given by $f(x) = \frac{x}{x+2}$ is one-one. Find the inverse of $[-1, 1] \rightarrow R_f$

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252. Consider f : R → R given by $f(x) = 4x + 3$. Show that f is invertible. Find the inverse of f.

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253. Consider $r \rightarrow [4, \infty]$ given by $f(x) = x^2 + 4$. Show that f is invertible with the increase $f^{-1} of f$ given by $f^{-1}(y) = \sqrt{y - 4}$, where R is the set of all non-negative real numbers.

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254. Consider $f: R \rightarrow [-5, \infty]$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible with $f^{-1}(y) = \left[\frac{\sqrt{y + 6} - 1}{3}\right]$

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255. Let $f: X \rightarrow Y$ be an invertible function. Show that f has unique inverse.

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256. Consider

$f: \{1, 2, 3\} \to \{a, b, c\}, givenby f(1) = a, f(2) = b$ and $f(3) = c$. Find

$f^{-}1$ and show that $(f^{-}1)^{-}1 = f$

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257. Let $f: X \to Y$ be an invertible function. Show that the inverse of

$f^{-}1$ is f, i.e. $(f^{-}1)^{-}1 = f$

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258. If $f: R \to R$ be given by $f(x) = (3 - x^3)^{1/3}$, then (fof) (x) is

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

B. x^3

C. x

D. $3 - x^3$

Answer:

Watch Video Solution

259. Let $f: R - \left\{-\frac{4}{3}\right\} \rightarrow R$ be a function defined as $f(x) = 4\frac{x}{3x+4}$. The inverse of f is the map g : Range $f \rightarrow R = \left\{-\frac{4}{3}\right\}$ given by

A. $g(y) = \frac{3y}{3-4y}$

B. $g(y) = \frac{4y}{4-3y}$

C. $g(y) = \frac{4y}{3-4y}$

D. $g(y) = \frac{3y}{4-3y}$

Answer:

Watch Video Solution

260. Determine whether or not each of the defination of '*' given below gives a binary operation. In the event that * is not a binary operation, give justification for this :

On Z^+, deifne '*' by a * b = |a-b|.

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261. Determine whether or not each of the defination of '*' given below gives a binary operation. In the event that * is not a binary operation, give justification for this :

OnZ^+, define'*' by a * b = ab

Watch Video Solution

262. Determine whether or not each of the defination of '*' given below gives a binary operation. In the event that * is not a binary operation, give justification for this :

On R, define '*' by a * b = ab^2

Watch Video Solution

263. Determine whether or not each of the defination of '*' given below gives a binary operation. In the event that * is not a binary operation, give justification for this :

On Z^+, deifne '*' by a * b = |a-b|.

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264. Determine whether or not each of the definition of * given below gives a binary operation. In the event that * is not a binary operation, given justification for this. On Z^+, define * by a * b = a

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265. For each binary operation '*' defined below, determine whether '*' is commutative and whether '*' is associative.

On Z, define * by a * b = a -b.

Watch Video Solution

266. For each binary operation '*' defined below, determine whether '*' is commutative and whether '*' is associative.

On Q, define * by a * b = ab +1

Watch Video Solution

267. For each binary operation '*' defined below, determine whether '*' is commutative and whether '*' is associative.

On Q, define * by a * b = $\frac{ab}{2}$

Watch Video Solution

268. For each binary operation '*' defined below, determine whether '*' is commutative and whether '*' is associative.

OnZ^+, define * by a * b $= 2^{ab}$

Watch Video Solution

Watch Video Solution

269. For each binary operation '*' defined below, determine whether '*' is commutative and whether '*' is associative.

On Z^+, define * by a * b = a^b

Watch Video Solution

270. For each binary operation '*' defined below, determine whether '*' is commutative and whether '*' is associative.

On R - (-1), define * by a * b = $\frac{a}{b+1}$

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271. Consider the binary operation $\wedge$ on the set {1,2,3,4,5} defined by a $\wedge$ b = min {a,b}, Write the operation table of the operation $\wedge$

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272. Consider a binary operation * on the set (1,2,3,4,5) given by the adjoining operation table.

*	1	2	3	4	5
1	1	1	1	1	1
2	1	2	1	2	1
3	1	1	3	1	1
4	1	2	1	4	1
5	1	1	1	1	5

Compute (2*3)*4 and 2* (3*4)

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273. Consider a binary operation * on the set (1,2,3,4,5) given by the adjoining operation table.

*	1	2	3	4	5
1	1	1	1	1	1
2	1	2	1	2	1
3	1	1	3	1	1
4	1	2	1	4	1
5	1	1	1	1	5

Is * commutaive ?

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274. Consider a binary operation * on the set (1,2,3,4,5) given by the adjoining operation table.

*	1	2	3	4	5
1	1	1	1	1	1
2	1	2	1	2	1
3	1	1	3	1	1
4	1	2	1	4	1
5	1	1	1	1	5

Compute (2*3)*(4*5).

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275. Let * be the binary operation on the set {1,2,3,4,5}, defined by a *' b = H.C.F of a and b. Is the operation *' same as the operation * defined above? Justify your answer.

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276. Let * be the binary operation on N given by a*b = l.c.m. of a and b. Find 5 * 7, 20 * 16

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277. Let * be the binary operation on N given by a * b = L.C.M. of a and b. Find. Is * commutative?

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278. Let $*$ be the binary operation on N given by $\cdot a \cdot b = L.C.M. of a$ and b. Find : Is $*$ associative?

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279. Let $*$ be the binary operation on N given by $\cdot a \cdot b = L.C.M. of a$ and b. Find : Find the identity of $*$ in N

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280. Let $*$ be the binary operation on N given by $\cdot a \cdot b = L. C. M. of a$ and b. Find : Which elements of N are invertible for the operation $*$?

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281. Is '*' defined on the set {1,2,3,4,5} by a*b = L.C.M. of a and b a binary operation ? Justif your answer.

Watch Video Solution

282. Let be the binary operation on N defined by a*b = H.C.F. of a and b: Is '*' commutative? Is * associative ? Does there exist identity for this binary operation on N ?

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283. Let $*$ be a binary operation on the set Q of rational numbers as follows: $a \cdot b = a - b$ find is it commutative?

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284. Let $*$ be a binary operation on the set Q of rational numbers as follows: $a \cdot b = (a - b)^2$ find is it associative?

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285. Let * be a binary operation on the set Q of rational numbers as follows : `a*b = (ab)/4 find is it commutative.

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286. Let $*$ be a binary operation on the set Q of rational numbers as follows: $a \cdot b = (a - b)^2$ find is it associative?

Watch Video Solution

Watch Video Solution

287. Let * be a binary operation on the set Q of rational numbers as follows : `a*b = (ab)/4 find is it commutative.

Watch Video Solution

288. Let $*$ be a binary operation on the set Q of rational numbers as follows: $a \cdot b = (ab)^2$ find is it associative?

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289. Show that the number of binary operations on {1, 2} having 1 as identity and having 2 as the inverse of 2 is exactly one.

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290. let $A = N \times N$ and * be the binary operation on A defined by : (a,b) * (c,d) = (a+c,b+d)`. Show that * is commutative and associative. Find the identify element for * on A, if any.

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291. State whether the following statement is true or false. Justify:For an arbitrary binary operation $\cdot$ on a set $N, a \cdot a = a, f \text{ or } alla \in N$

Watch Video Solution

292. State whether the following statements are true or false. Justify. If * is a commutative binary operation on N, then a*(b*c) = (c*b)*a

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293. State whether the following statements are true or false. Justify . For an arbitrary binary operation * on a set N $A \cdot a = a, \forall a \in N$.

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294. Consider a binary operation * on N defined as a* b = $a^3 + b^3$. Then

A. * both associative and commutative.

B. * commutative but not associative.

C. * associative but not commutative

D. * neither commutative nor associative.

Answer:

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295. Let $f: R \rightarrow R$, be defined as $f(x) = 10x + 7$. Find the function $g: R \rightarrow R$ such that $gof = fog = 1_R$

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296. Let $f: W \rightarrow W$ be defined as $f(n) = n - 1$, if n is odd and $f(n) = n + 1$, if n is even. Show that f is invertible. Find the inverse of f. Here, W is the set of all whole numbers.

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297. If $f: R \rightarrow R$ is defined by $f(x) = x^2 - 3x + 2$, find f(f(x)).

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298. Show that the function $f: R \rightarrow \{x \in R: -1 < x < 1\}$ defined by $f(x) = \frac{x}{1 + |x|}, x \in R$ is one one and onto function.

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299. Show that the function $f: R \to R$ given by $f(x) = x^3$ is injective.

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300. Give examples of two functions $f: N \to Z$ and $g: Z \to Z$ such that gof is injective but g is not injective.

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301. Give examples of two functions $f: N \to N$ and $g: N \to N$ such that gof is onto but f is not onto.

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302. Given a non empty set X, consider $P(X)$ which is the set of all subsets of X. Define the relation R in $P(X)$ as follows: For subsets A, B in

P(X), ARB if and only if $A \subset B$. Is R an equivalence relation on P(X)? Justify your answer.

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303. Given a non - empty set, X , consider the binary operation ** : $P(X) \times P(X) \rightarrow P(X)$ given by $A * B = A \cap B, \forall A, B \in P(X)$, where P(X) is the power set X. Show that X is the identity element for this operation and X is the only invertible element in P(X) with respect to the operation ** .

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304. Find the number of all onto functions formthe set {1,2,3,....,n} to itself.

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305. Let S = {a,b,c} and T = {1,2,3}. Find F^{-1} of the folowing functions F from S to T, if it exists. F = {(a,3), (b,2),(c,1)}

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306. Let S = {a,b,c} and T = {1,2,3}. Find F^{-1} of the folowing functions F from S to T, if it exists. F = (a,2),(b,1),(c,1)

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307. Consider the binary operations * : $R \times R \rightarrow R$ and $o : R \times R \rightarrow R$ defined as a * b = |a-b| and a o b = a for all a,b in R`. Show that '*' is commutative but not associative, 'o' is associative but not commutative.

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308. Given a non-empty set X, let $\cdot : P(X) \times P(X) \to P(X)$, be defined as $A \cdot B = (A - B) \cup (B - A), \forall A, B \in P(X)$.Show that the empty set ϕ is the identity for the operation * and all the elements A of P(X) are invertible with $A^{-}1 = A$.

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309. Define a binary operation * on the set {0,1,2,3,4,5} as

$a \cdot b = \begin{cases} a+b & \text{if } a+b<6 \\ a+b-6 & \text{if } a+b \geq 6 \end{cases}$ Show that zero is the identity for this operation and each element $a \neq 0$ of the set is invertible with 6 - a being the inverse of a.

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310. Let $A = \{-1, 0, 1, 2\}$, $B = \{-4, -2, 0, 2\}$ and $f, g : A \to B$, be functions defined by $f(x) = x^2 - x, x \in A$ and g(x)= 2|x-(1/2)|-1, x in A`. Are f and g equal? Justify your answer.

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311. Let $A = \{1, 2, 3\}$ Then number of relations containing (1, 2) and (1, 3) which are reflexive and symmetric but not transitive is :

A. 1

B. 2

C. 3

D. 4

Answer:

Watch Video Solution

312. Let $A = \{1, 2, 3\}$ Then number of equivalence relations containing (1, 2) is:

A. 1

B. 2

C. 3

D. 4

Answer:

Watch Video Solution

313. Let $f: R \to R$ be the signum function defined as $f(x) = \begin{cases} 1 & x > 0 \\ 0 & x = 0 \\ -1 & x < 0 \end{cases}$ and $g: R \to R$ be the greatest integer function given by $g(x) = [x]$ where [x] is greatest integer less than or equal to x.

Then, does fog and gof coincide in (0,1] ?

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314. Number of binary operations on theset (a,b) is

A. 10

B. 16

C. 20

D. 8

Answer:

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315. Fill in the blank:

The number of relations that can be defined from set A = (1,2,3) to the set B = (a,b,c) is ______

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316. Let the relation R be defined in N by aRb if 2 a + 3 b = 30. Then R = ...

Watch Video Solution

317. Fill in the blank:

Consider the set A = (0,1,2) and let R = (0,1), (1,0) be the relation on A, then R is a ________ relation on A.

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318. Let the relation R be defined on the set

$A = \{1, 2, 3, 4, 5\}$ by $R = \{(a, b) : |a^2 - b^2| < 8\}$: Then R is given by

....

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319. Fill in the blank:

The identity relation on any non-empty set is always an _____ relation.

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320. Fill in the blank:

Let f = (1,2), (3,5), (4,1) and g = (2,3), (5,1), (1,3)` then gof = ______and fog = ________.

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321. Fill in the blank:

If f (X) = $4 - (x - 7)^3$, then $f^{-1}(x) = \_ \quad \_\_ \_$

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322. Fill in the blank:

If f = (a,c), (b,d) and g = (c, a), (d,b) then range of gof is _______.

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323. Fill in the blank:

Let $f: R \rightarrow R$ be defined by $f(x) = \frac{x}{\sqrt{1+x^2}}$, then (fofof) (x) = _______

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324. Fill in the blank:

Let $f: R \rightarrow R$ be defined by $f(x) = \frac{1}{2+\cos x}$ for all $x \in R$, the range of f is ______.

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325. Fill in the blank:

Let * be a binary operation defined on Z as a * b = $a^2 - b^2$, then (-2)*(3*0) is equal to ______

Watch Video Solution

326. Consider the set A = {1, 2, 3} and R be the smallest equivalence relation on A, then R = ...

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327. Fill in the blank:

The domain of the function $f: R \rightarrow R$ defined by $f(x) = \sqrt{x^2 - 5x + 6}$ is _______.

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328. Fill in the blank:

The total number of injective functions that can be defined form a set A containg n distinct elements onto itself is ______.

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329. Fill in the blank:

Let R_1 be the set of all reals except 1 and * be the binary operation defined onR_1 as a* b = a + b - ab for all a, b $\in R_1$. The identity element with respect to the binary operation * is __________.

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330. Let Z be the set of all integers and R be the relation on Z defined as $R = (a, b) : a, b$in` Z and a-b is divisible by 5) Prove that R is an equivalence relation.

Watch Video Solution

331. Fill in the blank:

Let $f: R \to R$ be defined by $f(x) = \frac{1}{2 + \cos x}$ for all $x \in R$, the range of f is ______.

Watch Video Solution

332. If relation R defined on set A is an equivalence relation, then R is

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333. True or False statements :

Let R = (3,1), (1,3), (3,3)` be a relation defined on the set A = (1,2,3), then R is symmetric, transitive but not reflexive.

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334. Are the following statement true or false ? Justify the answer : Every rational number is a whole number.

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335. True or False statements :

Every function is invertible.

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336. True or False statements :

The relation R = (a,b), (ba,) on the set (A = a,b) is symmetric and transitive.

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337. Let A be a finite set. Then, each injective function from A into itself is not surjective.

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338. True or False statements :

Let A = (a,b,c) and R = (a,b),(a,c). Then R is a transitive relation.

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339. The relation R on the set A = {1, 2, 3} defined as R = {(1, 1), (1, 2), (2, 1), (3, 3)} is reflexive, symmetric and transitive.

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340. The function $f: R \rightarrow R$ defined by $f(x) = 1 + x^2$ is :

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341. Every relation which is symmetric and transitive is also reflexive.

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342. True or False statements :

Let N be the set of natural numbers. Then, the binary operation * on N defined as a * b = a + b for all a , b $\in$ N has the identity element.

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343. True or False statements :

A binary operatio on a set has always the identity element.

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344. The function $f : R \to R$ defined by $f(x) = 1 + x^2$ is :

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345. True or False statements :

Let N be the set of natural numbers. Then, the binary operation * on N defined as a * b = a + b for all a , b $\in$ N has the identity element.

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346. True or False statements :

The function $f: R \rightarrow R$ defined by f(x) = 3x - 2 is a bijection.

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347. Let A = {0, 1} and N be the set of natural numbers. Then the mapping f : N $\rightarrow$ A defined by f(2n - 1) = 0, f(2n) = 1, $\forall n \in N$, is onto.

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348. True or False statements :

The binary operation * defined in Z by a * b = a + b is commutative but not associative.

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349. An integer m is said to be related to another integer n if m is a integral multiple of n. This relation in Z is reflexive, symmetric and transitive.

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350. Let R be a relation from a set A to a set B, then:

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351. True or False statements :

Composition of functions is associative.

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352. True or False statements :

The function $f: R \to R$ defined by f(x) = 3x - 2 is a bijection.

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353. Let $f : A \rightarrow B$ and $g : B \rightarrow C$ be onto functions, show that gof is an onto function.

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354. Let $f : A \rightarrow B$ and $g : B \rightarrow C$ be onto functions, show that gof is an onto function.

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355. For all sets A, B and C, if $A \subset C$ and $B \subset C$, then $A \cup B \subset C$.

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356. Match the following :

(*i*) sin (90°–A)	(*a*) Sin A
(*ii*) Cos 0°	(*b*) 0
(*iii*) Sin 0°	(*c*) 1
(*iv*) Cas (90°–A)	(*d*) Cos A

.

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357. Consider the set A = (a,b). The smallest equivalence relation that can be defined on A is

A. {}

B. (a,a), (b,b)

C. (a,b),(b,a)

D. $A \times A$

Answer:

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358. Consider the set A = (1,2). Which of the following relations on A is symmetric, neither transitive nor reflexive?

A. (1,1), (2,2)

B. {}

C. (1,2)

D. (1,2), (2,1)

Answer:

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359. Let A be a finite set containing n distinct elements. The number of relations that can be defined from A to A is (a) 2^n (b) n^2 (c) 2^{n^2} (d) None of these

A. mn

B. $2^m n$

C. 2^{m+n}

D. none of these

Answer:

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360. Let T be the set of all triangles in the Euclidean plane, and let a relation R on T be defined as a R b if a is congruent to b $\forall$ a,b $\in$ T. Then R is

A. reflexive but not transitive

B. transitive but not symmetric

C. equivalence

D. none of these

Answer:

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361. Consider the non-empty set consisting of children in a family and a relation R defined as aRb if a is brother of b. Then R is

A. symmetric but not transitive

B. transitive but not symmetric

C. neither symmetric nor transitive

D. both symmetric and transitive.

Answer:

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362. If a relation R on the set {1, 2, 3} be defined by R = {(1, 2)}, then R is

A. reflexive

B. transitive but not symmetric

C. symmetric

D. none of these

Answer:

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363. Let R be a relation defined by R = {(a, b) : $a \geq b$}, where a and b are real numbers, then R is

A. an equivalence relation

B. reflexive, transitive but not symmetric

C. symmetric, transitive but not reflexive

D. neither transitive nor relfexive but symmetric.

Answer:

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364. Let R be the relation defined on the set N of natural numbers by the rule xRy iff x + 2 y = 8, then domain of R is

A. (2,4,8)

B. (2,4,6)

C. (2,4,6,8)

D. (1,2,3,4)

Answer:

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365. Let A = (a,b,c) and R = (a,a), (b,b), (c,c), (b,c), (a,b) be a relation on A, then R is

A. symmetric

B. transitive

C. reflexive

D. none of these

Answer:

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366. Let A = {1, 2, 3} and consider the relation, R = {1, 1}, (2, 2), (3, 3), (1, 2), (2, 3), (1, 3). Then R is

A. reflexive but not transitive

B. reflexive but not symmetric

C. symmetric and transitive

D. neither symmetric not transitive.

Answer:

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367. The maximum number of equivalence relations on the set A = {1, 2, 3} are

A. 1

B. 2

C. 3

D. 5

Answer:

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368. Let A = (1,2,3) and R = (1,1), (2,2), (1,2), (2,1), (1,3) then R is

A. reflexive

B. symmetric

C. transitive

D. none of these

Answer:

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369. Let A = {1, 2, 3}, which of the following is not an equivalence relation of A { (1 , 1) , (2 , 2) , (3 , 3) }

A. (1,2), (2,2), (3,3)

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

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

D. none of these

Answer:

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370. Let R be a relation on the set N of natural numbers defined by n R m if n divides m. Then R is

A. reflexive and symmetric

B. transitive and symmetric

C. equivalence

D. reflexive, transitive but not symmetric.

Answer:

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371. Let A = (1,2,3). Which of the following relations is a function from A to A?

A. (1,1), (2,1), (3,2)

B. (1,1), (1,2)

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

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

Answer:

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372. Let A = (1,2,3) and B = (2,3,4), then which of the following is a function from A to B?

A. (1,2), (1,3), (2,3), (3,3)

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

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

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

Answer:

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373. Let A be a finite set containing n distinct elements. The number of functions that can defined from A to A is

A. 2^n

B. n^n

C. n

D. none of these

Answer:

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374. If the set A contains 5 elements and the set B contains 6 elements, then the number of one-one and onto mappings from A to B is

A. 720

B. 120

C. 0

D. none of these

Answer:

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375. Set A has 3 elements and the set B has 4 elements. Then the number of injective mapping that can be defined from A to B is

A. 144

B. 12

C. 24

D. 64

Answer:

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376. Let N be the set of natural numbers and the function f:N $\rightarrow$ N be defined by f(n) = 2n + 3 $\forall$ n $\in$ N. Then f is

A. surjective

B. injective

C. bijective

D. none of these

Answer:

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377. Let $f: R \to R$ be defined by $f(x) = \frac{1}{x} \forall x \in R$, then f is

A. one-one

B. onto

C. bijective

D. not defined

Answer:

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378. Let $f : R \to R$ be defined by f (x) $= x^2 - 3x + 4$ for all x $\in$ R , then f^{-1} (2) is equal to

A. (1,2)

B. (1,2)

C. (1,2)

D. none of these

Answer:

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379. Let $f : R \to R$ be defined as f(x) = 2x for all $x \in N$, then f is

A. onto

B. invertible

C. one-one

D. none of these

Answer:

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380. If f is a function from a set A to A, then f is invertible iff f is

A. one-one

B. onto

C. both one-one and onto

D. none of these

Answer:

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381. Let $f : R \to R$ be defined by f(x) = 3x - 4, then f^{-1} (x) =

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

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

C. 3x + 4

D. none of these

Answer:

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382. Let $f:[2, \infty) \to R$ be the function defined by $f(x) = x^2 - 4x + 5$, then the range of f is

A. R

B. $(1, \infty)$

C. $(4, \infty)$

D. $(5, \infty)$

Answer:

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383. Let $f: R \rightarrow R$ be defined by $f(x) = x^2 + 1$, then, f^{-1}(17) and f^{-1} (-3) are respectively

A. $\phi(4, \ -4)$

B. $(3, \ -3), \phi$

C. $(4, \ -4), \phi$

D. $(4, \ -4), (2, \ -2)$

Answer:

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384. Which of the following function from Z to itself are bijections?

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

B. $f(x) = x + 2$

C. $f(x) = 2x + 1$

D. $f(x) = x^2 + 1$

Answer:

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385. Let $f: R \rightarrow R$ be the functions defined by $f(X) = x^3 + 5$, then f^{-1} (x) is

A. $(x + 5)^{1/3}$

B. $(x - 5)^{1/3}$

C. $(5 - x)^{1/3}$

D. 5-x

Answer:

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386. Let $f: R - \left(\frac{3}{5}\right) \to R$ be defined by $f(X) = \frac{3x+2}{5x-3}$, then

A. $f^{-1}(x) = f(x)$

B. $f^{-1}(x) = f(x)$

C. $(fof)x = -x$

D. $f^{-1}(x) =$ (1/19)` f(x)

Answer:

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387. Let $f: R \to R$be given byf(X) = tan x, then f^{-1} (1) is

A. $\frac{\pi}{4}$

B. $\left\{n\pi + \frac{\pi}{4}, n \in Z\right\}$

C. does not exist

D. none of these

Answer:

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388. Let $f: R \rightarrow R$ be defined by

$$f(x) = \begin{cases} 2x & x > 3 \\ x^2 & 1 \leq x < 3 \\ 3x & x \leq 1 \end{cases}$$

Then $f(-1) + f(2) + f(4)$ is

A. 14

B. 5

C. 17

D. 9

Answer:

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389. Let $f(x) = ax^2 + bx + c$ where $a, b, c \varepsilon R, a \neq 0.$ Suppose $|f(x)| \leq 1, \forall x \varepsilon [0, 1]$ then

A. is given by $\dfrac{1}{ax + b}$

B. is given by $\dfrac{x - b}{a}$

C. does not exist as f is not onto

D. doesnot exist as f is not one-one.

Answer:

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390. Which of the following functions is differentiable at x = 0 ?

A. f = (1,1), (2,1), (3,1)

B. f = (1,2), (2,3), (3,1)

C. f=(1,2), (2,3), (3,2)

D. f = (1,1), (2,2), (3,1)

Answer:

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391. Let $f: R \to R$ be defined f(x) = sin x and g: $R \to R$ be defined by $g(x) = x^2$, Find fog .

A. $x^2 \sin x$

B. $(\sin x)^2$

C. $\sin x^2$

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

Answer:

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392. Let $f: R \to R$ be defined as f(X) = 3x. Then

A. $\frac{3x^2-5}{9x^4-30x^2+26}$

B. $\frac{3x^2-5}{9x^4-6x^2+26}$

C. $\frac{3x^2}{x^4+2x^2-4}$

D. $\frac{3x^2}{9x^4+30x^2-2}$

Answer:

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393. Let $f: X \to Y$ and $g: Y \to Z$ be two invertible functions. Then gof is also invertible with $(gof)^{-}1 = f^{-}1ofg^{-}1$

A. $f^{-1}og^{-1}$

B. fog

C. $g^{-1}of^{-1}$

D. gof

Answer:

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394. Let f (x) = x^2 and g (x) $= \sqrt{x}$, then

A. (gof) (-2) = 2

B. (fog) (2) = 4

C. (gof) (2) = 4

D. (gof) (3) = 3

Answer:

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395. If `f(x) = x+1 And g (X) = 2x, then f (g(x)) is equal to

A. f(a) = g(c)

B. f(b) = g (b)

C. f (d) = g (b)

D. f(c) = g (a)

Answer:

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396. If $f(x) = \{x,$ when x is rational and $0,$ when x is irrational $g(x) = \{0,$ when x is rational and $x,$ when x is irrational then $(f - g)$ is

A. one-one and into

B. neither one-one nor onto

C. many one and onto

D. one-one and onto

A. fog (x) = -1 for all x $\in$ R

B. gof (x) = 1 for all x $\in$ R

C. fog(x) = 1 for all $x \in R$

D. none of these

Answer:

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397. Let $f: R \to R$ be defined by $f(x) = \frac{1}{x} \forall x \in R$, then f is

A. constant

B. 1+X

C. x

D. none of these

Answer:

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398. let $f: N \to R$ be the function defined by $f(x) = \frac{2x-1}{2}$ and $g: Q \to R$ be another function defined by g(x) = x+2, then (gof) $\left(\frac{3}{2}\right)$ is

A. 1

B. 1

C. $\left(\frac{7}{2}\right)$

D. none of these

Answer:

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399. The identity element for the binary operation * defined on Q - (0) as a * b $=\frac{ab}{2}$ for all a , b $\in$ Q - (0) is

A. 1

B. 0

C. 2

D. none of these

Answer:

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400. If A = (a,b), then the number of binary operations that can be defined on A is

A. 4

B. 2

C. 16

D. 1

Answer:

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401. Let * be the binary operation defined on R by a * b = 1 + ab for all a, b $\in$ R, then the operation * is

A. commutative but not associative

B. associative but not commutative

C. neither commutative nor associative

D. both commutative and associative.

Answer:

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