RAVI MATHS TUITION CENTER, CHENNAI-82. WHATSAPP - 8056206308

Relations And Functions

12th Standard

Maths

8 x 2 = 16

1) Determine whether the following relations are reflective, symmetric and transitive:
Relation R in the set A = {1, 2, 3...13, 14} defined as R = {(x, y) : 3x - y = 0}

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

3) 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*}

4) If the binary operation * on the set of integers Z is defined by a*b=a+3b^2 then find the value of 2 * 4.

5) If the binary operation * defined on Q is defined as a*b=2a+b-ab, for all $a, b \in Q$, find the value of 3*4.

6) If R = [(x, y) : X + 2y = 8] is a relation on N, write the range of R

7) How many equivalence relations on the set {1,2, 3} containing (1, 2) and (2, 1) are there in all? Justify your answer.

8) 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

5 x 3 = 15

9) Show that the function $f : N \to N$ given by f (x) = 2x is one-one but not onto.

10) 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 $\wedge$.

11) Show that the relation R in the set of real numbers, defined as:
$R = \{(a, b) : a \leq b^2\}$ is neither reflexive nor symmetric nor transitive.

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

13) If A = {l, 2, 3} and relation R = {(2, 3)} in A.
Check whether relation R is reflexive, symmetric and transitive.

1 x 4 = 4

14) A relation R on a set A is said to be an equivalence relation on A iff it is
(a) Reflexive i.e.., $(a, a) \in R \,\forall\, a \in A$
(b) Symmetric i.e., $(a, b) \in R \Rightarrow (b, a) \in R \,\forall\, a, b \in A$
(c) Transitive i.e., $(a, b) \in R$ and $(b, c) \in R \Rightarrow (a, c) \in R \,\forall\, a, b, c \in A$
Based on the above information, answer the following questions.
(i) If the relation R = {(1, 1), (1, 2), (1, 3), (2,2), (2, 3), (3,1), (3, 2), (3, 3)} defined on the set A = {1, 2, 3}, then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence
(ii) If the relation R = {(1, 2), (2,1), (1, 3), (3, I)} defined on the setA = {1, 2, 3}, then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence
(iii) If the relation R on the set N of all natural numbers defined as R = {(x, y) : y = x + 5 and x < 4}, then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence
(iv) If the relation R on the set A = {1, 2, 3, , 13, 14}defined as R = {(x, y) : 3x - y = 0}, then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence

9 x 5 = 45

15) Check the injectivity and surjectivity of the following
(i) f : N $\to$ N given by f(x) = x^2
(ii) f : R $\to$ R given by f(x) = x^2
(iii) *f* : **Z** → **Z** given by *f*(*x*) = *x*^{2}
(iv) *f* : **N** → **N** given by *f*(*x*) = *x*^{3}
(v) *f* : **Z** → **Z** given by *f*(*x*) = *x*^{3}

16) 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 be another relation on X given by R_2 = {(x, y): (x, y)} {1, 4, 7} or {x, y} {2, 5, 8} or {x, y} {3, 6, 9}} show that R_1 = R_2

17) 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.

18) Let * be a binary operation on Q defined by a*b = $\frac{3ab}{5}$. Show that * is commutative as well as associative. Also find its identify if it exists.

19) Show that the relation S in the set R of real numbers, defined as
S = {(a, b): a,b $\in$R and a $\leq$b^3} is neither reflexive, nor symmetric nor transitive.

20) Consider the binary operation * on the set {1, 2, 3, 4, 5} defined by a*b = min{a, b}. Write the operation table of the operation *.

21) Show that the relation R in the Set A = {1, 2, 3, 4, 5} given by R = {(a, b) : Ia - b I is divisible by 2} is an equivalence relation. Write all the equivalence classes of R.

22) Check whether the relation R defined in set A = {1.2,3, ...,13, 14} as R = {(x, y) : 3x - y = 0} is reflexive, symmetric and transitive.

23) Show that the relation S in the set R of real numbers defined as S = {(a, b) : a, b $\in$ R and a $\leq$ b^3 } is neither reflexive nor symmetric nor transitive.

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