CLASS XII – MATHEMATICS – CHAPTER 01

RELATIONS AND FUNCTIONS

Name: Date:

Q01. A Relation is said to be Reflexive if _____ every a $\in$ A where A is non empty set.

Q02. A Relation is said to be Symmetric if _____ $\forall$ a, b, $\in$ A.

Q03. A Relation is said to be Transitive if _____ (a, c) $\in$ R , $\forall$ a, b, c $\in$ A.

Q04. Define universal relation? Give example.

Q05. What is trivial relation?

Q06. Prove that the function f: R → R, given by f(x) = 2x, is one – one.

Q07. State whether the function is one – one, onto or bijective f: R → R defined by $f(x) = 1+ x^2$.

Q08. Let S = {1, 2, 3}
Determine whether the function f: S → S defined as below have inverse.
f = {(1, 2), (2, 1), (3, 1)}

Q09. Find gof f(x) = |x|, g(x) = |5x + 1|

Q10. Let f, g and h be function from R to R show that (f + g) oh = foh = goh

Q11. If $a * b = a + 3b^2$, then find 2 * 4

Q12. Show that function f: N → N, given by f(x) = 2x, is one – one.

Q13. State whether the function is one – one, onto or bijective f: R → R defined by f(x) = 3 – 4x.

Q14. Let S = {1, 2, 3}
Determine whether the function f: S → S defined as below have inverse.
f = {(1, 1), (2, 2), (3, 3)}

Q15. Find got f(x) = |x|, g(x) = |5x -2|.

Q16. Consider f: {1, 2, 3} → {a, b, c} given by f(1) = a, f(2) = b and f(3) = c find f^{-1} and show that $(f^{-1})^{-1} = f$.

Q17. If f(x) = x + 7 and g(x) = x – 7, x $\in$ R find (fog) (7)

Q18. What is bijective function?

Q19. f: R → R be define as $f(x) = x^4$ whether the above function is one – one onto, or other.

Q20. Let S = {1, 2, 3}. Determine whether the function f: S → S defined as below have inverse.
f = {(1, 3) (3, 2) (2, 1)}

Q21. Find gof $f(x) = 8x^3$, $g(x) = x^{1/3}$

Q22. Let f, g and h be function from R + R. Show that (f.g) oh = (foh) . (goh)

Q23. Let * be a binary operation defined by a * b = 2a + b – 3. find 3 * 4

Q24. Let T be the set of all triangles in a plane with R a relation in T given by
R = {(T1, T2): T1 is congruent to T2}. Show that R is an equivalence relation.

Q25. Show that the relation R in the set Z of integers given by R = {(a, b) : 2 divides a-b}.

Q26. Let L be the set of all lines in plane and R be the relation in L define if
R = {(l1, L2): L1 is ⊥ to L2 } .
Show that R is symmetric but neither reflexive nor transitive.

Q27. 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.

Q28. Let L be the set of all lines in Xy plane and R be the relation in L define as
R = {(L1, L2): L1 || L2}.
Show then R is on equivalence relation. Find the set of all lines related to the line Y=2x+4.

Q29. Let A = N→N and * be the binary operation on A define by (a, b) * (c, d) = (a + c, b + d)
Show that * is commutative and associative.

Q30. Let f: N → N be defined by f(x) = $\begin{cases} (n+1)/2, & \text{if n is odd for all n } \varepsilon \text{ N} \\ \frac{n}{2}, & \text{if n is even} \end{cases}$. Examine whether the function f is onto, one–one or bijective

Q31. Show that the relation R in the set all books in a library of a collage given by
R {(x, y) : x and y have same no of pages}, is an equivalence relation.

Q32. Let * be a binary operation. Find the binary operation a * b = a – b + ab is
(a) Commutative (b) Associative

Q33. Let f: R → R: f (x) = 2x + 1 and g: R → R: g(x) = x^2 – 2 find
(a). gof (b). fog.

Q34. Let A = R – {3} and B = R- {1}. Consider the function of f: A → B defined by f(x) = $\frac{x-2}{x-3}$ is f one–one and onto.

Q35. Show that the relation R defined in the set A of all triangles as R = { (T1,T2):T1 is similar to T2 }, is an equivalence relation. Consider three right angle triangles T1 with sides 3, 4, 5. T2 with sides 5, 12, 13 and T3 with sides 6, 8, 10. Which triangles among T1, T2 and T3 are relations?

Q36. Determine which of the following operation on the set N are associative and which are commutative.
(a) a * b = 1 for all a, b ∈ N (b) a * b = $\frac{a+b}{2}$ for all a, b, ∈ N

Q37. Let A and B be two sets. Show that f: A **x** B → B **x** A such that f(a, b) = (b, a) is a bijective function.