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Questions:

Assertion and reason

1. Assertion: f : R $\rightarrow$ R is a function defined by f(x) = $\frac{2x+1}{3}$. Then $f^{-1}(x) = \frac{3x-1}{2}$.
Reason: f(x) is not a bijection.
(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.
(d) Assertion is incorrect, reason is correct.

2. Assertion: If f is even function, g is odd function, then $\frac{f}{g}$, ($g \neq 0$) is an odd function.
Reason: If f(-x)=-f(x) for every x of its domain, then f(x) is called an odd function and if f(-x) = f(x) for every x of its domain, then f(x) is called an even function.
(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.
(d) Assertion is incorrect, reason is correct.

3. Assertion: Let L be the set of all lines in a plane and R be the relations in L defined as R = {(L_1, L_2): L_1 is perpendicular to L_2}.This relation is not equivalence relation.
Reason: A relation is said to be equivalence relation if it is reflexive,symmetric and transitive.
(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.
(d) Assertion is incorrect, reason is correct.

4. Assertion: If f(x) is odd function and g(x) is even function, then f(x) + g(x) is neither even nor odd.
Reason: $f(x) = \begin{cases} f(x), & f(x) is even \\ -f(x), & f(x) is odd \end{cases}$
(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.
(d) Assertion is incorrect, reason is correct.

5. Assertion: If f: R $\rightarrow$R and g : R $\rightarrow$R be two mappings such that f(x) = sin x and g(x) = x^2, then fog $\neq$gof.
Reason: (fog) x = f(x)g(x) = (gof) x
(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.
(d) Assertion is incorrect, reason is correct.

6. Assertion: Let A = {-1, 1, 2, 3} and B = {1, 4, 9}, where f: A $\rightarrow$B given by f(x) = x^2, then f is a many-one function.
Reason: If $x_1 \neq x_2 \Rightarrow f(x_1) \neq f(x_2)$, for every $x_1, x_2 \in$domain, then f is one-one or else many-one.
(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.
(d) Assertion is incorrect, reason is correct.

Multiple Choice Question

7. Let R be a relation on the set L of lines defined by l_1 R l_2 if l_1 is perpendicular to l_2, then relation R is
(a) reflexive and symmetric (b) symmetric and transitive (c) equivalence relation (d) symmetric

8. Given triangles with sides T_1 : 3, 4, 5; T_2 : 5, 12, 13; T_3 : 6, 8, 10; T_4 : 4, 7, 9 and a relation R in set of triangles defined as R = {(Δ_1, Δ_2) : Δ_1 is similar to Δ_2}. Which triangles belong to the same equivalence class?
(a) T_1 and T_2 (b) T_2 and T_3 (c) T_1 and T_3 (d) T_1 and T_4

9. Given set A ={1, 2, 3} and a relation R = {(1, 2), (2, 1)}, the relation R will be
(a) reflexive if (1, 1) is added (b) symmetric if (2, 3) is added (c) transitive if (1, 1) is added (d) symmetric if (3, 2) is added

10. Given set A = {a, b, c). An identity relation in set A is
(a) R = {(a, b), (a, c)} (b) R = {(a, a), (b, b), (c, c)} (c) R = {(a, a), (b, b), (c, c), (a, c)} (d) R= {(c, a), (b, a), (a, a)}

11. A relation S in the set of real numbers is defined as xSy $\Rightarrow$ $x - y + \sqrt{3}$ is an irrational number, then relation S is
(a) reflexive (b) reflexive and symmetric (c) transitive (d) symmetric and transitive

12. Set A has 3 elements and the set B has 4 elements. Then the number of injective functions that can be defined from set A to set B is
(a) 144 (b) 12 (c) 24 (d) 64

13. Given a function lf as f(x) = 5x + 4, x $\in$ R. If g : R $\rightarrow$ R is inverse of function 'f then
(a) g(x) = 4x + 5 (b) g(x) = $\frac{5}{4x-5}$ (c) g(x) = $\frac{x-4}{5}$ (d) g(x) = 5x – 4

14. If f : R $\longrightarrow$ R be given by f (x) = $(3 - x^3)^{\frac{1}{3}}$, then fof (x) is
(a) $x^{\frac{1}{3}}$ (b) x^3 (c) x (d) $(3 - x^3)$.

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

16. Let a relation T on the set R of real numbers be T = { (a,b) : 1 + ab < 0, a,$\in$R}. Then from among the ordered pairs (1,1) (1,2)(1,-2)(2,2), the only pair that belongs to T is_____.
(a) (2,2) (b) (1,1) (c) (1,-2) (d) (1,2)

17. For real number x and y, we write xRy $\Leftrightarrow$ x - y + $\sqrt{2}$ irrational number. Then the relation R is
(a) Reflexive (b) Symmetric (c) Transitive (d) Equivalence

18. Let A = {1, 2, 3, 4} and let R = {(2, 2), (3, 3), (4, 4), (1, 2)} be a relation on A. Then, R is

(a) Symmetric (b) Transitive (c) Reflexive (d) Equivalence relation

19. If A = {1,3,5,7} and define a relation, such that R = { (a,b) a,b ∈ A : |a+b| = 8}. Then how many elements are there in the relation R
(a) 8 (b) 16 (c) 1 (d) 4

20. In the set N x N the relation R is defined by (a, b) R (c, d) ⇔ ad = bc. Then R is
(a) symmetric and transitive but not reflexive (b) reflexive and transitive but not symmetric (c) Equivalence relation (d) Partial order relation

21. If A = {1, 2, 3, 4} and B = {1, 3, 5} and R is a relation from A to B defined by (a, b) ∈ element of R ⇔ a < b. Then, R = ?
(a) {(2, 3), (4, 5), (1, 3), (2, 5)} (b) {(1, 3), (1, 5), (2, 3), (2, 5), (3, 5), (4, 5)} (c) {(2, 3), (4, 5), (1, 3), (2, 5), (5, 3)} (d) {(5, 3), (3, 5), (5, 4), (4, 5)}

22. Let R be the relation on the set {1, 2, 3, 4} given by R = {(1, 2), (2, 2), (1, 1), (4, 4), (1, 3), (3,3), (3,2)}. then R is
(a) R is reflexive and symmetric but not transitive. (b) R is symmetric and transitive but not reflexive. (c) R is an equivalence relation.
(d) R is reflexive and transitive but not symmetric

23. Let A = {1,2,3,4,5,6,7}. P={1,2}, Q = {3, 7}. Write the elements of the set R so that P, Q and R form a partition that results in equivalence relation
(a) {4,5,6} (b) {0} (c) {1,2,3,4,5,6,7} (d) { }

24. Let R be a relation on set A of triangles in a plane. R = { (T_1 , T_2) : T_1, T_2 element of A and T_1 is congruent to T_2} Then the relation R is _____
(a) Equivalence relation (b) Transitive (c) Symmetric (d) Reflexive

25. Let C = {(a, b): $a^2 + b^2 = 1$; a, b ∈ R} a relation on R, set of real numbers. Then C is
(a) Equivalence relation (b) Reflexive (c) Transitive (d) Symmetric

26. Let R be a relation on N (set of natural numbers) such that (m, n) R (p, q)mq(n + p) = np(m + q). Then, R is
(a) An Equivalence Relation (b) Only Reflexive (c) Symmetric and reflexive (d) Only Transitive

27. If f: R → R and g: R → R are given by $f(x) = \cos x$ and $g(x) = 3x^2$, then
(a) $\text{gof}(x) = \cos^2 x$ (b) $\text{fog}(x) = \cos x^2$ (c) $gof \neq fog$ (d) $fog = gof$

28. $Let f(x) = \begin{cases} -1, & x < 0 \\ 0, & x = 0 \text{ and } g(x) = 1 + x - [x] \end{cases}$
where [x] denotes the greatest integer less than or equal to x. Then, for all x, f(g(x)) is equal to
(a) x (b) 1 (c) g(x) (d) f(x)

29. A function f : R → R defined as f(x) = x^2 - 4x + 5 is
(a) injective but not surjective (b) surjective but not injective. (c) both injective and surjective. (d) neither injective nor surjective.

30. Select the correct option out of the four given options
Let R be a relation in the set N given by
R = {(a, b):ab - 2,b > 6}
Then,
(a) (8, 7) ∈ R (b) (6,8) ∈ R (c) (3,8) ∈ R (d) (2,4) ∈ R

31. Let A (3,5). Then, number of reflexive relations on A is
(a) 2 (b) 4 (c) 0 (d) 8

32. A relation R in set A = {1,2,3} is defined as R = {(1,1), (1, 2), (2, 2), (3, 3)}. Which of the following ordered pair in R shall be removed to make it an equivalence relation in A?
(a) (1, 1) (b) (1, 2) (c) (2, 2) (d) (3, 3)

33. Let the relation R in the set A = {x ∈ Z : 0 ≤ x ≤ 12}, given by R = {(a, b): ab is a multiple of 4}. Then [1], the equivalence class containing 1, is
(a) {1, 5, 9} (b) {0,1,2,5} (c) ϕ (d) A

34. The function f : R→ R defined as f(x) = x^3 is
(a) one-one but not onto (b) not one-one but onto (c) neither one-one nor onto (d) both one-one and onto

35. 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. Based on the given information f is best defined as
(a) surjective function (b) injective function (c) bijective function (d) None of the above

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QUESTION BANK 365