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Questions:

5 Marks

1. Consider a function $f : \left[0, \frac{\pi}{2}\right] \to \mathbf{R}$, given by $f(x) = \sin x$ and $g : \left[0, \frac{\pi}{2}\right] \to \mathbf{R}$, given by $g(x) = \cos x$ Show that f and g are one-one, but f + g is not one-one.

3 Marks

2. Show that a one-one function $f : \{1, 2, 3\} \to \{1, 2, 3\}$must be onto.
3. Show that the function $f : R \to R$ given by $f(X) = X^3$ is injective:
4. Check whether the relation R in R defined by $R = \{(a, b) : a \leq b^3\}$ is reflexive, symmetric or transitive.
5. 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 ⊂ B. Is R an equivalence relation on P(X)? Justify your answer.
6. Check if the relation R in the set R of real numbers defined as R = {(a, b): a < b} is
(i) symmetric, (ii) transitive

2 Marks

7. Let f:$X \to Y$ be a function Define a relation R on X given be R=[(a,b) ; (f(b)] Show that R is an equivalence relation ?
8. State whether the function f :R → R, defined by f(x) = 3 - 4x is onto or not.
9. 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.
10. Let f : {2, 3, 4, 5} $\to$ {3, 4, 5, 9} and g : {3, 4, 5, 9} $\to$ {7, 11, 15} be functions defined as f (2) = 3, f (3) = 4, f (4) = f (5) = 5 and g(3) = g(4) = 7 and g(5) = g(9) = 11. Find gof.
11. Let R = {(a, a^3) : a is a prime number less than 5} be a relation. Find the range of R.
12. Let A = {1, 2, 3, 4} and R be the equivalence relation on A x A defined by (a, b) R (c, d) iff a + d = b + c. Find the equivalence class [(1, 3)].

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