Assignment : 3

Relation and Function

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By: Ravi Panchal

1) Determine wheather each of the following relations are reflexive, symmetric and transitive:

(i) $R = \{(x, y) : y = x + 5 \text{ and } x < 4\}$ where R in the set N of natural numbers

(ii) Relation R in the set Z of all integers defined as $R = \{(x, y) : x - y \text{ is an integer}\}$

(iii) Relation R in R defined as $R = \{(a, b) : a \leq b\}$

2) Show that each of the relation R in the set $A = \{x \in Z : 0 \leq x \leq 12\}$ given by

(i) $R = \{(a, b) : |a - b| \text{ is a multiple of } 4\}$

(ii) $R = \{(a, b) : a = b\}$

is an equivalence relation. Find the set of all elements related to each case.

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

4) Check the injectivity and surjectivity of the following function

(i) $f : N \to N$, $f(x) = x^2$.

(ii) $f : R \to R$, $f(x) = x^2$

(iii) $f : Z \to Z$, $f(x) = x^3$

5) Show that Signum f^n $f : R \to R$ given by

$$f(x) = \begin{cases} 1 & x > 0 \\ 0 & x = 0 \\ 1 & x < 0 \end{cases}$$

is neither one-one nor onto.

6) Let f, g, h are F^n from R to R show that $(f+g)oh = foh + goh$. and $(f \cdot g)oh = (foh) \cdot (goh)$

7) For $f : R \to R$ given by $f(x) = 4x + 3$. Show that f is invertible and find f^{-1}

8) Show that $(f^{-1})^{-1} = f$ for $f : X \to Y$ bean invertible function.