Class – XII (Sc) Homework for Summer Vacation 2017

Sub: — Mathematics.

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

a) Relation R in the set $A = \{1, 2, 3, \ldots, 13, 14\}$ defined as

$$R = \{(x, y) : 3x - y = 0\}$$

b) Relation R in the set N of natural numbers defined as

$$R = \{(x, y) : y = x + 5 \text{ and } x < 4\}$$

2). Check the injectivity and surjectivity of the following functions:-

a) $f : N \to N$ given by $f(x) = x^2$

b) $f : Z \to Z$ given by $f(x) = x^3$

3). Let $f : N \to N$ be defined by $f(n) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd} \\ \frac{n}{2}, & \text{if } n \text{ is even} \end{cases}$ for all $n \in N$.

State whether the function f is bijective. Justify your answer

4). Let $A = R - \{3\}$ and $B = R - \{1\}$. Consider the function $f : A \to B$ defined by $f(x) = \left(\frac{x-2}{x-3}\right)$. Is f one-one and onto? Justify your answer.

5). Let $f : N \to R$ be a function defined as $f(x) = 4x^2 + 12x + 15$. Show that $f : N \to S$, where, S is the range of f, is invertible. Find the inverse of f.

6). Show that $f : [-1, 1] \to R$, given by $f(x) = \frac{x}{(x+2)}$ is one-one. Find the inverse of the function $f : [-1, 1] \to$ Range f.

7). Consider $f: R_+ \to [4, \infty)$ given by $f(x) = x^2 + 4$. Show that f is invertible with the inverse f^{-1} of f given by $f^{-1}(y) = \sqrt{y-4}$, where R_+ is the set of all non-negative real numbers.

8). Consider $f: R_+ \to [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible with $f^{-1}(y) = \left(\frac{(\sqrt{y+6}) - 1}{3} \right)$.

9) If $f: R \to R$ be given by $f(x) = (3 - x^3)^{1/3}$, then $fof(x)$ is

(A) $x^{1/3}$ (B) x^3 (C) x (D) $(3 - x^3)$.

10). Miscellaneous Exercise on Chapter 1.

11). Exercise 2.2.

12). Miscellaneous Exercise on Chapter 2.

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