HANU
HANOI UNIVERSITY
FACULTY OF INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE

HOMEWORK

Discrete Mathematics

TUT-04: Problem Set 04

Problem 1: Prove that:

a) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

b) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

Problem 2:

Given a function $f: R \to R; f(x) = x^2 + 3x - 4$ and $A = \{0; -6\}$.
Find the set $f(A) \wedge f^{-1}(A)$.

Problem 3:

Given a function $f: N \to N$ and $f(x) = 2x + 1$. Determine whether the function f is injection, surjection and bijection.

Problem 4:

Given a function $f: R \backslash \{1\} \to R$

a) $f(x) = \dfrac{x+1}{x-1}$; find $f^{-1}(\backslash)$

b) What is the inverse of f.

c) Compute: $f \circ f^{-1} \wedge f^{-1} \circ f$

Problem 5:

Determine if f is a function from $R \backslash R$

a) $f(x) = 1/x$

b) $f(x) = \pm\sqrt{x^2 + 1}$

c) $f(x) = \sqrt{x}$

Problem 6:

The following function $f: A \to B$ is injection, surjection or bijection. Determine f^{-1} if possible.

a) $A = R; B = R; f(x) = x^2 + 2x - 3$
b) $A = [4,9]; B = [21,96]; f(x) = x^2 + 2x - 3$
c) $A = R; B = R; f(x) = 3x - 2 \vee x \vee ¿$

Problem 7:

Given a function $f: R \to R; f(x) = x^3 - x$. Find a, b *if* $f^{-1}(a) = \{0; -1; b\}$

Problem 8:

a) Given a function $f: R \to R; f(x) = \dfrac{2x}{1+x^2}$. Determine if f is injection or surjection?
b) Find the range of image f(R)
c) Given a function $g: R^{\circ} \to R; g(x) = 1/x$. Find the $f \circ g \wedge g \circ f$