**Lab 09 -Functions**

**Objective**

Solving exercises from the textbook in chapter 2.3

**Current Lab Learning Outcomes (LLO)**

By completion of the lab, the students should be able to:

1. will understand functions and different types of functions

2. Finding the domain and range of function, composite of function and graph of function.

3. Will be able to solve shorter/easier or longer / harder problems given in the textbook.

**Lab Requirements**

Students allowed using their lecture notes in the lab and use blackboard slides in order to solve the exercises.

**Lab Assessment**

1- Divide students to groups and let them to solve the given example.

2- Discuss the answers with the groups and write on board the optimal solution.

**Lab Description**

In this lab, the following exercises are going to be solved and explained to them:

1. Why is f not a function from R to R if

a) f (x) = 1/x?

b) *f (x)* = ±

1. Find the domain and range of these functions. Note that in each case, to find the domain, determine the set of elements assigned values by the function.

**a)** the function that assigns to each nonnegative integer its last digit

**b)** the function that assigns the next largest integer to a positive integer

**c)** the function that assigns the number of bits left over when a bit string is split into bytes (which are blocks of 8 bits)

1. find the domain of the function f(x)=x2+3x+5/x2-5x+4.
2. find the domain and range of the function f(x)=x-2/3-x
3. Find these values.

a) b) c) d) e)

1. Consider these functions from the set of students in a discrete mathematics class. Under what conditions is the function one-to-one if it assigns to a student his or her

**a)** Mobile phone number.

**b)** Student identification number.

**c)** Final grade in the class.

**d)** Home town.

1. Determine whether the function *f* : **Z** × **Z** → **Z** is onto if

**a)** *f (m, n)* = *m* + *n*. **b)** *f (m, n)* = *m*2 + *n*2. **c)** *f (m, n)* = *m*.

**d)** *f (m, n)* = |*n*|. **e)** *f (m, n)* = *m* − *n*.

1. Determine whether each of these functions is a bijection from **R** to **R**.

**a)** *f (x)* = 2*x* + 1 **b)** *f (x)* = *x*2 + 1 **c)** *f (x)* = *x*3 **d)** *f (x)* = *(x*2 + 1*)/(x*2 + 2*)*

1. Determine whether each of these functions from **Z** to **Z** is one-to-one.

**a)** *f (n)* = *n* − 1 **b)** *f (n)* = *n*2 + 1 **c)** *f (n)* = *n*3  **d)** *f (n)* = ⎡n/2⎤

1. How many bytes are required to encode *n* bits of data where *n* equals

**a)** 7? **b)** 17? **c)** 1001? **d)** 28,800?

1. Draw the graph of the function



1. Given *f*(*x*) = 2*x* + 3 and *g*(*x*) = –*x*2 + 5, find (*f* o *g*)(*x*), (*g* o *f* )(*x*).
2. Let f(x) = -x + 4, find f-1(x). f:R🡪 R b) f(x) = x3+1, f:R🡪 R