**Department of Applied Mathematics and Computational Sciences**

**PSG College of Technology**

**Programme: MSc SS VIII semester**

**Course: Functional Programming Lab**

**PROBLEM SHEET 1**

**(exercises based on Programming in Haskell, Graham Hutton)**

**INTRODUCTION**

1. Give another possible calculation for the result of double (double 2).

**double :: Int -> Int**

**double x = x \* 2**

**main :: IO ()**

**main = do**

**let result = double (double 2)**

**putStrLn $ "double (double 2) = " ++ show result**

**ans : 8**

1. Show that sum[x] = x for any number x.

**sumEqualsX :: (Eq a, Num a) => [a] -> Bool**

**sumEqualsX xs = sum xs == head xs**

**main :: IO ()**

**main = do**

**putStrLn $ "sum [5] == 5: " ++ show (sumEqualsX [5])**

**putStrLn $ "sum [5,4,3] == ?: " ++ show (sumEqualsX [5,4,3])**

1. Define a function product that produces the product of a list of numbers, and show using your definition that product [2, 3, 4] = 24.

**product' :: [Int] -> Int**

**product' [] = 1**

**product' (x:xs) = x \* (product' xs)**

**main = do**

**print (product' [2,3,4])**

1. How should the definition of the function *qsort* be modified so that it produces a *reverse* sorted version of a list?
2. What would be the effect of replacing ≤ by *<* in the definition of *qsort*? Hint: consider the example *qsort* [2*,* 2*,* 3*,* 1*,* 1].

**FIRST STEPS**

1. Parenthesise the following arithmetic expressions:

2 ↑ 3 x 4

2 x 3 + 4 x 5

2 + 3 x 4 ↑ 5

1. Work through the examples from this chapter using Hugs.
2. The script below contains three syntactic errors. Correct these errors and then check that your script works properly using Hugs.

N = a ’div’ length xs

where

a = 10

xs = [1, 2, 3, 4, 5]

1. Show how the library function last that selects the last element of a nonempty list could be defined in terms of the library functions introduced in this chapter. Can you think of another possible definition?
2. Show how the library function init that removes the last element from a non-empty list could similarly be defined in two different ways.