Wentworth Institute of Technology

COMP3350 Programming Languages

Lab 2 – Functional Programming in F#

This lab is on functional programming using F#. You will use an IDE, such as Visual Studio with F# support or some other suitable development environment, for creating, compiling and testing the programs.

Write and test the following functions. Use the provided unit test cases to check your solutions.

1. Write a function, cubes, that will display the cubes of a list of positive integers using an anonymous function (Lambda expression) :

Test the function for the list [2; 4; 6] [5]

1. In mathematics, the binomial coefficient C( n, k) is the number of ways of picking ‘k’ unordered outcomes from ‘n’ possibilities. It is given by the formula: [10]

C (n, k) = n! / k! (n − k)!

Implement the function C in F# and run the following test. Note that the factorials for the large values of **n** could overflow the stack so you might to use the integer type BigInt of unlimited precision, if it happens. This means you will have to cast integers to bigint in the computation.

You can perform computations with integers too big for the 64-bit integer type by using the bigint type. bigint is not considered a basic type; it is an abbreviation for System.Numerics.BigInteger.

Test for n = 10 and k = 5

C 10 5

Result: 252

1. Vector add

vecadd adds two integer lists, element by element. Assume the two int lists contain the same number of elements [5]

vecadd [1;2;3] [4;5;6]

Result list = [5;7;9]

vecadd [1; 2; -3; 4] [4; -5; 6; 7]

Result list = [5; -3; 3; 11]

1. Use vecadd to implement matrix addition. The function matadd will add two 2 x 3 matrices. A matrix is represented as a list of lists. Each sublist could be a row or a column. Assume the matrices to be added are: [10]

M1 = 1 2 3

4 5 6

M2 = 7 8 9

1 2 3

Organized as sublists of columns, the matrices to be added are:

M1 = [[1; 4]; [2; 5]; [3; 6]]

M2 = [[7; 1]; [8; 2]; [9; 3]]

Organized as sublists of rows, the matrices to be added are:

M1 = [[1;2;3];[4;5;6]]

M2 = [[7;8;9];[1;2;3]]

What to submit on BrightSpace

1. The F# programs and the output of each program.