Wentworth Institute of Technology

COMP3350 Programming Languages

Lab 1 – 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.

You will write, compile and test the following simple programs. You should check the examples and programs we worked on in class using the dotnetfiddle command line interpreter.

1. Implement an add function. Run the following tests.
2. add 25 15
3. add 18 34 23 19
4. Write a function round that takes an integer argument and implements the following expression:

if x >= 100 return 100

elif x < 0 return 0

else x

Write a program that implements the expression using

1. if-then-else, and then using
2. Pattern matching

Test the program for different values of x to test the various conditions

1. Implement the function factorial using recursion. Find the factorial of 6.
2. Generate a list of integers using list comprehension. Implement a recursive function to add the integers using pattern matching.
3. The List type in F# supports the following properties.

| **Property** | **Type** | **Description** |
| --- | --- | --- |
| [Head](https://msdn.microsoft.com/library/5f9414fd-6bdb-470a-8b72-40016db30740) | 'T | The first element. |
| [Empty](https://msdn.microsoft.com/library/44406ecb-1918-4d32-b32a-ca1f69840386) | 'T list | A static property that returns an empty list of the appropriate type. |
| [IsEmpty](https://msdn.microsoft.com/library/3ba087b2-2fc2-406d-b10a-cff6a19322da) | bool | true if the list has no elements. |
| [Item](https://msdn.microsoft.com/library/bdb2553a-0e54-4ff8-baed-ab1aac8f5dae) | 'T | The element at the specified index (zero-based). |
| [Length](https://msdn.microsoft.com/library/25f715c8-9daa-4c4d-a6c7-26772f9dab4d) | int | The number of elements. |
| [Tail](https://msdn.microsoft.com/library/2a6f8eb9-dc32-41aa-8b62-2baffaface91) | 'T list | The list without the first element. |

Given the list list1 = [1; 2; 3], use the appropriate List properties from the aforementioned table to complete the print statements.

printfn "list is Empty: %b" (?)

printfn "list’s Length: %d" (?)

printfn "First element of list: %d" (?)

printfn "Second element if list: %d" (?)

printfn "Third element of list: %d" (?)

printfn "Last element of list: complte%d" (?)

What to submit on BrightSpace .

The F# programs and the output of each program. Please do not forget to submit the output!