Lab 1 - Introductory Assignments

In this lab, we will write Python programs a few classic problems that you might have already coded in C/C++/Java.

Save your code in a separate 'lab1' directory. You might want to use a separate file for each problem.

Problem 1: Write a program that takes a positive integer as input and prints its factorial. Write two separate functions, one that computes the factorial iteratively, and the other recursively.

Problem 2: Write a program to print the first n Fibonacci numbers. Write separate iterative and recursive versions. Which version do you suspect is more efficient ? Why ?

Problem 3: Write a program that tests if a number is prime or not. Input a number from the user. The output should be 'True' if the number is a prime, 'False' otherwise.

Problem 4: Write a program to sort a list of integers using Bubble sort and Selection sort. First take as input the size 'n' of the array, then read in the 'n' input integers that need to be sorted.

Problem 5: String Replacement. Write a program that takes as input 3 strings str1,str2 and str3, and replaces all occurrences of str2 in str1 by str3.
For e.g. if
str1='men will be men'
str2='men'
str3='women'
The output string will be 'women will be women'

Optional Assignment : Do an experimental evaluation to compare the runtimes of Bubblesort and Insertion sort (and maybe other sorting algorithms that you may know, like Selection sort, Mergesort and Quicksort). You will have to measure the runtime of your program for large number of inputs. Consider a range of input sizes (say n = 5 to 100000 or larger). For each input size n, randomly generate 10 arrays of size n and take the runtime to be their average. Show your results by plotting a graph showing the runtime for different input size.