LABORATORY 01

OBJECTIVES

- Be able to setup the work environment for python (download and install python 3.x, www.python.org)
- Execute simple instructions using the python interpreter
- Write and execute a simple python program using python IDLE editor (part of python installation)
- Simple problems just to exercise read, write, conditional, loop, function

PROPOSED PROBLEM STATEMENTS

[1] Write and test a program that solves the problem below.

[2] Generate the first prime number larger than a given natural number n.

[3] Determine the age of a person, in number of days.

[4] Determine a calendar data (as year, month, day) starting from two integer numbers representing the year and the day number inside that year.

[5] Given the natural number n, determine the prime numbers p1 and p2 such that n = p1 + p2 (check the Goldbach hypothesis).

[6] Determine the twin prime numbers p1 and p2 immediately larger than the given non-null natural number n. Two prime numbers p and q are called twin if q-p = 2.

[7] Find the smallest number m from the Fibonacci sequence, defined by f[0]=f[1]=1, f[n]=f[n-1]+f[n-2], for n>2, larger than the given natural number n. So, find k and m such that f[k]=m, m>n and f[k-1] <=n.

[8] Consider a given natural number n. Determine the product p of all the proper factors of n.

[9] For a given natural number n find the minimal natural number m formed with the same digits. E.g. n=3658, m=3568.

[10] The palindrome of a number is the number obtained by reversing the order of digits. E.g. palindrome (237) = 732). For a given natural number n, determine its palindrome.

[11] For a given natural number n find the largest natural number written with the same digits. E.g. n=3658, m=8653.

[12] The numbers n1 and n2 have the property P if their writings in basis 10 have the same digits (e.g. 2113 and 323121). Determine whether two given natural numbers have the property P.

[13] Determine the n-th element of the sequence 1,2,3,2,5,2,3,7,2,3,2,5,... obtained from the sequence of natural numbers by replacing composed numbers with their prime divisors, without memorizing the elements of the sequence.

[14] Determine the n-th element of the sequence 1,2,3,2,2,5,2,2,3,3,3,7,2,2,3,3,3,... obtained from the sequence of natural numbers by replacing composed numbers with their prime divisors, each divisor d being written d times, without memorizing the elements of the sequence.

[15] Generate the smallest perfect number larger than a given natural number n. If such a number does not exist, a message should be displayed. A number is perfect if it is equal to the sum of its divisors, except itself. E.g. 6 is a perfect number (6=1+2+3).

[16] Generate the larges prime number smaller than a given natural number n. If such a number does not exist, a message should be displayed.

[17] Generate the largest perfect number smallest than a given natural number n. If such a number does not exist, a message should be displayed. A number is perfect if it is equal to the sum of its divisors, except itself. E.g. 6 is a perfect number (6=1+2+3).