ASSIGNMENT 01

OBJECTIVES

- Be able to setup the work environment for python (download and install python 3.x from 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

REQUIREMENTS

- Select one problem statement from each set and solve it.
- Each solution must have a console-based interface
- Use procedural programming, make sure that each function only does one thing
- Expected inputs as well as output must be clearly stated to the user.

PROPOSED PROBLEM STATEMENTS

SET A

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

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

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

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

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

SET B

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

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

[8]   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.

[9]   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.

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

[11]   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.

SET C

[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 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).