1E3 Practical 5
17 February 2016

Objectives: FOR loops.

Task#1:
Marks: 2
Summary: Write a program to assist investors in their investment decisions by displaying a table of return on investment using different rates.
Details: Write a C++ program to print a table of the value of an initial investment for a range of interest rates and a range of years. An example is given below. Your program should request the initial investment amount from the user. You may also wish to request other parameters from the user, such as the ranges and steps for the two axes.

Notes/Hints/Additional Details:
The value after y years of an investment x at an interest rate of r% is $(x^* (1+r/100)^y)$. For example 50 euro at 20% for 5 years yields $(50*1.2^5)$. Use the power function, called pow, from the cmath library:

`x = pow(i, n)` gives x the value of i to the power of n.

Rate	5 years	10 years	15 years	20 years	25 years	30 years
5.00	1276.28	1628.89	2078.93	2653.30	3386.35	4321.94
5.50	1306.96	1708.14	2232.48	2917.76	3813.39	4983.95
6.00	1338.23	1790.85	2396.56	3207.14	4291.87	5743.49
.	.	.	.	.	.	.
.	.	.	.	.	.	.
9.50	1574.24	2478.23	3901.32	6141.61	9668.36	15220.31
10.00	1610.51	2593.74	4177.25	6727.50	10834.71	17449.40

Sample extract of investment table (for initial investment of 1000 euro):

Task#2:
Marks: 2 marks (1 for the part 2a of this task and 1 for part 2b).
Summary: Write a program to compute and display the **Fibonacci** series.
Details: The Fibonacci series starts with 0, 1, … Thereafter each term is the sum of the two previous terms.

0 1 1 2 3 5 8 13 …

Part 2a: Your first version of the program (1 mark) should ask the user for a small positive integer, i, and should printout the first *i* fibonacci numbers. For example if the user enters 8, the program prints 0 1 1 2 3 5 8 13. (Avoid big ***i***s – Fibonacci grows very quickly.)

Part 2b: Your second program (1 mark) should ask the user for a large positive integer N, and should print out the Fibonacci series upto but not including N, and should also report **how many terms** were produced. For example if N is 2000, your sequence will end at 1597, the 18th term, since the next term would be greater than 2000.

Task#3 (Advanced Task):
Mark: 1
Summary: This is an extension to the Fibonacci program.
Details: Write a program to determine how many Fibonacci terms can be produced before the C++ integers (int) you are using overflow – that is they are not big enough to reperesent the number. Use the fact that when you add two very large positive integers, such that their sum overflows the bits available, you get a negative integer.
If you use the data type long (for long integer) instead of int to represent the fibonacci, does it change anything? How about if you use the data type short (for short integer) instead of int?