CS&E 1222

Lab 3 – Math Functions Lab Assignment – 20 points

- ✓ The *lab* must be accomplished solely by you:
  - ➢ DO NOT look at anyone's code other than your own, including code from another's student in your section or another section of the course, or any third party source, e.g. the Internet
  - ➢ DO NOT share or copy anyone else's code for any graded assignment
  - ➢ DO NOT work in pairs or groups
- ✓ All cases of academic misconduct will be reported to the *Committee On Academic Misconduct* (COAM).

Setting up the Programming Environment

Effective commenting and tabbing will affect your grade. The "style" of your program should follow the style of the sample programs in the lecture notes. Also see the example code from Lab #1. Your program should have the file name, your name, creation and last modification dates and a brief description of the program in the comments. ***In addition, read the document on "Commenting" found in the Content tab on Carmen under "Tutorials"***.

1. At the Linux command line type `mkdir lab3`. This will create a new directory named **`lab3`**. Work out of this directory. In order to do that, type `cd lab3`. This changes the current working directory to the directory **`lab3`**.
2. If you have created the directory **`lab3`**, then just type `cd lab3`.
3. Copy the file **`invest.exe`** in the directory **`/class/cse1222/9643/lab3`** by typing

```
cp /class/cse1222/9643/lab3/invest_solution.exe .
```

Be sure to include ***9643*** (this is your course section indicator) and the period, ".".

Programming Assignment

Write a program **`investments.cpp`** which computes the value of an investment after a certain number of years at a certain interest rate. Run **`invest_solution.exe`** to see an example of this program. Your program should behave **exactly** like this program with the same input and output.

1. Type "`emacs invest.cpp &`" (without the double quotes) at the terminal to create a new file, **`investments.cpp`**.

2. Prompt and read in the initial investment (type `integer`).

3. Prompt and read in the interest rate (type `integer`).

4. Prompt and read in the number of months (type `integer`).

5. Compute the final value of the investment as:

$$x * (1 + (R/100))^Y$$

   where x is the initial investment, R is the interest rate, and Y is the number of years. Use the C++ function `pow` to compute $(1 + (R/100))^Y$. Note that you will compute the investment value in years. Thus, you will need to convert the number of months to number of years.

6. Compute the profit from the investment as:

profit = (final investment) – (initial investment)

7. Output:

```
Value of your investment compounded annually after Y year(s)
is D dollars.
Profit from your investment after Y year(s) is P dollars.
```

   where **Y** is the number of years, **D** is the final value of the investment, and **P** is the profit.

8. Compute the final value of the investment continuously compounded as:

$$x * e^{(R/100)Y}$$

   where e is Euler's number and equal to 2.71828.

9. Output:

```
Value of your investment continuously compounded after Y
year(s) is D' dollars.
Profit from this investment is P' dollars.

The difference between both investment types is F dollars.
```

   where **D'** is the final value of the investment, **P'** is the profit, and **F** is the difference of the profits between both investment types.

10. Compile and run your program and check it against **`invest_solution.exe`**.

11. Be sure to add the header comments "File", "Created by", "Creation Date" and "Synopsis" at the top of each file. Each synopsis should contain a brief description of what the program

does (read the document on "Commenting" found in the Content tab on Carmen under "Tutorials").

12. Be sure to add header comments "Created by" and "Creation Date" at the top of each file.

13. Be sure that there is a comment documenting each variable.

Submit Your Work

Important: Any program which does not compile and run will receive no credit!
If you are not sure what this means please ask your instructor.

Submit the file **`investments.cpp`** using the *Lab3* drop box on Carmen. **DO NOT** submit the file **`a.out`**. **DO NOT** submit work from other assignments. This will not be graded.