

EECS 10: Assignment 3

October 7, 2005

Due Monday 10/17/2005 12:00pm

1 Homework Problem 1: Compute the exponential function [20 points]

Write a program in C which computes the exponential function.

The exponential function can be algebraically approximated using an infinite sum:

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$

Your program must use only the four basic operations such as addition, subtraction, multiplication and division. The goal is to compute the exponential value such that it has a precision of 3 decimal places. For example, if the value of $e^6 = 403.4287935$, then your program must output $e^6 = 403.428xxx$. You should use as many terms from the above formula as necessary to just achieve the above mentioned precision for the three values given below.

When executed, your program should look like this:

```
Please enter the real value x:  
Exponential value of x is approximately....
```

Compile your program and run it using the values -1.9467, 0.5 and 1.874 as inputs.

You should submit `exponential.c`, `exponential.txt` and `exponential.script` for this problem.

NOTE: For the `exponential.txt`, you should explain how you achieved the requested precision.

2 Homework Problem 2: Exercise 3.20, pg 93 [20 points]

You should submit `interest.c`, `interest.txt` and `interest.script`. Use the following cases as inputs:

- 1) principal = 1000.00, rate = 0.5, days = 365
- 2) principal = 2000.00, rate = 0.0865, days = 120
- 3) principal = 10500.00, rate = 0.1, days = 3690
- 4) principal = -1, rate = 0.5, days = 365

3 Bonus Problem: [5 points]

Modify the program implemented in Homework Problem 2 (Exercise 3.20) such that it checks for a maximal range of 100.00 to 1000000.00 for principal.

If the principal falls out of its specified range, let the program repeat to ask for the principal (until a valid value or the termination value is entered)

If principal falls out of range, your program should print

```
principal out of the specified range...
```

and then it should again ask for the principal.

Use the test cases from the homework problem 2 with only the principal values changed to:

- 1) Principal = 50.00
- 2) principal = 1,000,500.00
- 3) principal = 20,000.00
- 4) principal = -1

You can use the same files from Homework Problem 2 by simply adding your modification to the same source code (`interest.c`). You should explain both Problem 2 and 3 in the `interest.txt` file.

4 What to turn in

Submission for these files will be similar to last week's assignment. The only difference is that you need to create a directory called `hw3/`. Put all the files listed above in that directory and run the `/ecelib/bin/turnin` command to submit your homework.