

CS 185

Programming Assignment 2

Remember: The major point of this assignment is for you to learn how to submit your homework correctly. You should strive to follow all of the directions exactly as specified in this document. The syllabus that was handed out during the first day of class also contains important information on how to submit your homework. If you are still unsure of how to do something, you should ask for help, either from myself or from a tutor in the lab or from another student.

Copyright Notice

Copyright © 2011 DigiPen (USA) Corp. and its owners. All rights reserved.

No parts of this publication may be copied or distributed, transmitted, transcribed, stored in a retrieval system, or translated into any human or computer language without the express written permission of DigiPen (USA) Corp., 9931 Willows Road NE, Redmond, WA 98052

Trademarks

DigiPen® is a registered trademark of DigiPen (USA) Corp.

All other product names mentioned in this booklet are trademarks or registered trademarks of their respective companies and are hereby acknowledged.

Details

This is a short assignment to practice creating simple functions using iteration. You'll also gain more experience using floating-point numbers. The program will approximate the value of the mathematical constant (e).

The value of e can be expressed as an infinite series:

$$e = 1/0! + 1/1! + 1/2! + 1/3! + \dots + 1/n!$$

The result of each iteration will be used to create a table of approximations for “ e ”, comparing the algorithm as the iteration increases. The table will look something like this:

Approximations for e

Iteration	e Value
1	1.000000000000
2	2.000000000000
3	2.500000000000
4	2.666666666667
5	2.708333333333
6	2.716666666667
7	2.718055555556
8	2.718253968254
9	2.718278769841
10	2.718281525573
11	2.718281801146
12	2.718281826198
13	2.718281828286
14	2.718281828804
15	2.718281829586

You are given a file called [main.cpp](#), which includes the main function. There are two functions prototyped in that file. One to compute the value of e and one to compute the factorial of a number. You must implement both of these functions *exactly as prototyped* in another file named **e.cpp**.

An [output.txt](#) file is given to you so that you can compare your output with the expected output.

Note: *I expect the exact output. So be careful and use a tool (such as: WinMerge) that will check the difference between two text files.*

This assignment will require you to perform some simple mathematical calculations such as calculating the factorial of a number. The factorial of a non-negative integer n , denoted by $n!$, is the product of all positive integers less than or equal to n . (eg: $5! = 5 \times 4 \times 3 \times 2 \times 1$).

Note: The factorial of 0 is 1.

Other notes:

1. If a value in your code is constant, use a `#define` instead of the literal value.
2. The only data types you should use are “**unsigned int**” and “**double**”.
3. Do not try and “optimize” your code by doing all of the calculations in one statement. This is not how you optimize. You should work to achieve these qualities in this order:
 - a. Correctness
 - b. Readability
 - c. Compactness
 - d. Performance
4. Pay attention to “*expression types*”. You might need to use typecasting in your code in order to get the right output or remove compiler warnings!!!!

```
int i = 12;  
float f = (float)i;
```

The time to complete this assignment should be less than 2 hours. However, don't feel bad if you spend more time on it, especially if you are taking the time to code it in the best way possible. Remember, your code says a lot about the type of software developer you are going to be. Professional developers can look at a people's coding and make judgments about them (for better or worse.)

Comments

In this and future assignments, you are required to include:

- A file header comment in every piece of source file. The format is shown in the “Comments.cpp” file given to you in the beginning of the semester and should be present at the very top of all your code.
- Function header for each function you create. The format is shown in the “Comments.cpp” file given to you in the beginning of the semester and should be present at the top of every function.
- Inline commenting for your code.

What to submit

You must submit the CPP file (***e.cpp***) in a single .zip file (go to the class page on moodle and you will find the assignment submit link). ***Do not submit any other files than the ones listed.***

If you've forgotten how to submit files, the details are posted in the syllabus and in the assignment guidelines document. Failure to follow the instructions will result in a poor score on the assignment (and possibly a zero).

Special note:

The due date/time posted is the positively latest you are allowed to submit your code. Since the assignments can easily be completed well before the deadline, you should strive to turn it in as early as possible. If you wait until the deadline, and you encounter unforeseen circumstances (like being sick, or your car breaking down, or something else), you may not have any way to submit the assignment on time. Moral: **Don't wait until the last day to do your homework.**