

## CSE-278: Introduction to Systems Programming

### Lab #2

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#### Part 1: Testing integer division and remainder operators

Write a C++ program that inputs a four-digit integer, separates the integer into its digits and prints them in reverse order separated by two spaces each. [Hint: Use the integer division and remainder operators.] For example, if the user types in 4315, the program should print:

5 1 3 4

#### Part 2: File I/O

Consider the following incomplete C++ program:

```
#include <iostream>
int main()
{
    .
    .
    .
}
```

a. Write a statement that includes the header files *fstream*, *string* and *iomanip* in this program.

ANS:

```
#include <iostream>
#include <fstream>
#include <iomanip>
int main()
{
    .
    .
    .
}
```

**b.** Write statements that declare **inFile** to be an ifstream variable and **outFile** to be an ofstream variable.

**ANS:**

```
ifstream inFile;  
ofstream outFile;
```

**c.** The program will read data from the file **inData.txt** and write output to the file **outData.txt**. Write statements to open both these files, associate inFile *with* inData.txt and associate outFile *with* outData.txt

**ANS:**

```
inFile.open("inData.txt");  
outFile.open("outData.txt");
```

**d.** Suppose that the file **inData.txt** contains the following data:

```
3 4 5  
15.6  
"Mark" "Taylor" 28  
18500 3.5  
B
```

The numbers in the *first line* represent the Side A, Side B and Side C of a Triangle. The number in the *second line* represents the radius of a circle (Assume that  $\pi = 3.1416$ ). The *third line* contains the first name, last name, and the age of a person. The first number in the *fourth line* is the savings account balance at the beginning of the month and the second number is the interest rate per year. The *fifth line* contains an uppercase letter between B and Z (inclusive). Write statements so that after the program executes, the contents of the **outData.txt** are shown as below. If necessary, declare additional variables. Your statements should be general enough so that if the content of the input file changes and the program is run again (without editing and recompiling), it outputs the appropriate results.

Triangle:

Side A= 3, Side B = 4, Side C = 5, area = 6, perimeter = 12

Circle:

Radius = 15.60, area = 764.54, circumference = 98.02

Name: Mark Taylor, age: 28

Beginning balance = \$18500.00, interest rate = 3.50

Balance at the end of the month = \$18553.96

The character that comes **after** B in the ASCII set is C

e. Write statements that close the input and output files.

ANS:

```
inFile.close();  
outFile.close();
```

f. Write a complete C++ program that tests the statements in parts a through e.

### Hints for Part 2:

- You should include the math header file and call appropriate routine
- You should calculate the area of Triangle using *Heron's* formula, defined as follows:

$s = (a+b+c)/2$  where a, b and c are the side lengths of the triangle

$area = \sqrt{(s*(s-a)*(s-b)*(s-c))}$  [square root over all the terms]

- Financial compound interest computed as follows:  $F = P(1 + i)^n$  Where F is the future value of money P is the present value of money *i* is the interest rate in percentage (i.e., rate /100, also have to divide by 12 to make monthly interest rate), represent as decimal number *n* is the time period

## Part #3: Submission

- No late assignments will be accepted!
- This work is to be done individually
- The submission file will be saved with the name **Lab2\_yourMUID.pdf**
- The submission file will be saved with the name **Lab2Part1\_yourMUID.cpp**
- The submission file will be saved with the name **Lab2Part2\_yourMUID.cpp**
- Assignment is due Mon/Tue February 17/18, 2020 before Midnight
- On or before the due time, drop the *electronic copy* of your work in the *canvas*

**Don't forget to Turn in the three files!**

**Lab2\_yourMUID.pdf**

**Lab2Part1\_yourMUID.cpp**

**Lab2Part2\_yourMUID.cpp**