

Homework 3 – Due: 09/18/2024 11:59 pm

Problem 1. [30 points] Write a C++ program that ask the user to enter a character. If the character is an upper-case letter, convert the character to the corresponding lower-case letter. Otherwise, do nothing. The code should then display the character on the screen.

Test your results using the following five cases: 'A', 'd', 'J', '0', '#' and report your test results in the write-up.

Problem 2. [35 points] The Gregorian reform modified the Julian calendar's scheme of leap years as follows: every year that is exactly divisible by 4 is a leap year, except for years that are divisible by 100 but not divisible by 400. For example, the years 1700, 1800, and 1900 were not leap years, but the years 1600 and 2000 were leap years. Write a C++ program that ask the user to enter a year and the program should display whether it is a leap year or not on screen.

Test your results using year 1700, 1701, 1804, 2020 and 2000 and report your output in the write-up.

Problem 3. [35 points] Implement Banker's rounding algorithm: (1) ask the user to enter a number (2) if the fraction is less than 0.5, round down; if the fraction is greater than 0.5, round up; if the fraction is equal to 0.5, round to the nearest even number (3) display the rounded number on the screen.

Please testing the following four numbers 4.4, 8.6, 0.5, 1.5 as input and report what are the output in your write up.

What to submit:

There should be 4 files in your submission:

1. A write up (any type- .txt, .docx, .pdf are all fine) that contains your answers to all questions in problem 1-3.
2. The .cpp file for your problem 1. Please name this file as [YourLastName]_prob1.cpp.
3. The .cpp file for your problem 2. Please name this file as [YourLastName]_prob2.cpp.
4. The .cpp file for your problem 3. Please name this file as [YourLastName]_prob3.cpp.

Optional Short answers questions. The following questions will not be graded. You may use them for preparing your next quiz.

(1) What is the value of the variable **letter** after running following two statements?

```
char letter = 'D';  
letter++;
```

(2) Assume:

```
double x = 11.5;  
int m = 11;  
int n = 5;
```

What is the value of the following four expressions?

```
x - m/ n  
x - double (m / n)
```

(3) What are the values of the variable a and b:

```
int a = 5.0/2*(1.0/2);  
  
double b = 5.0/2*double(1/2);
```

(4) What is wrong with the following two lines of code?

```
int count;  
count++;
```

(5) Identify and correct all errors the following code that allows the user to enter a number x and displays x^2.

```
#include <iostream>  
using namespace std;  
  
int main()
```

```
{  
    double x  
    double y = x*x;  
  
    cin << x;  
    cout << "x^2 is " << y << endl;  
  
    return 0;  
}
```

(6) What is the value of the following four expressions:

```
(true && true) || false  
(false && true) || true  
(5 > 6 || 4 > 3) && (7 > 8)  
!(7 > 6 || 3 > 4)
```