PROGRAMMING WITH C++

LAB 3

Xi'an Jiaotong-Liverpool University
西交利物浦大学

Question 1: Displaying Time

Write a program that obtains hours and minutes from seconds.

```
#include <iostream>
using namespace std;

int main()
{
  // Prompt the user for input
  int seconds;
  cout << "Enter an integer for seconds: ";
  cin >> seconds;
  int minutes = seconds / 60;
  int remainingSeconds = seconds % 60;
  cout << seconds << " seconds is " << minutes <<
    " minutes and " << remainingSeconds << " seconds " << endl;

  return 0;
}
```

Question 2： Order the Cities

Write a program that prompts the user to enter two cities which starts with the capital letter and then displays them in alphabetical order.

```
#include <iostream>
#include <string>
using namespace std;
int main()
{
  string city1, city2;
  cout << "Enter the first city: ";
  getline(cin, city1);
  cout << "Enter the second city: ";
  getline(cin, city2);
  cout << "The cities in alphabetical order are ";
  if (city1 < city2)
    cout << city1 << " " << city2 << endl;
  else
    cout << city2 << " " << city1 << endl;
  return 0;
}
```

Question 3: Body Mass Index

Body Mass Index (BMI) is a measure of health on weight. It can be calculated by taking your weight in kilograms and dividing by the square of your height in meters. The interpretation of BMI for people 16 years or older is as follows:

BMI	Interpretation
below 16	serious underweight
16-18	underweight
18-24	normal weight
24-29	overweight
29-35	seriously overweight
above 35	gravely overweight

```
#include <iostream>
using namespace std;
int main()
{
  // Prompt the user to enter weight in kilograms
  cout << "Enter weight in kilograms (kg): ";
  double weight;
  cin >> weight;
  // Prompt the user to enter height in meters
  cout << "Enter height in meters (m): ";
  double height;
  cin >> height;

  double bmi = weight / (height * height);
  // Display result
  cout << "BMI is " << bmi << endl;
  if (bmi < 18.5)
    cout << "Underweight" << endl;
  else if (bmi < 25)
    cout << "Normal" << endl;
  else if (bmi < 30)
    cout << "Overweight" << endl;
  else
    cout << "Obese" << endl;
  return 0;
}
```

Question 4: A Simple Math Learning Tool

This example creates a program for a first grader to practice subtractions.

The program randomly generates two single-digit integers number1 and number2 with number1 >= number2 and displays a question such as “What is 9 – 2?” to the student, as shown in the sample output.

After the student types the answer, the program displays a message to indicate whether the answer is correct.

```
#include <iostream>
#include <ctime> // for time function #include <cstdlib> // for rand and srand functions
using namespace std;
int main()
{  // 1. Generate two random single-digit integers
  srand(time(0));
  int number1 = rand() % 10;
int number2 = rand() % 10;
  // 2. If number1 < number2, swap number1 with number2
  if (number1 < number2)
  {    int temp = number1;
    number1 = number2;
    number2 = temp; }
  // 3. Prompt the student to answer  “what is number1 – number2?”
  cout << "What is " << number1 << " - " << number2 << "? ";
  int answer;
  cin >> answer;
  // 4. Grade the answer and display the result
  if (number1 - number2 == answer)
    cout << "You are correct!";
  else
    cout << "Your answer is wrong." << endl << number1 << " - "
        << number2 << " should be " << (number1 - number2) << endl;
  return 0; }
```

Question 5:

Write a program that lets the user enter a year and checks whether it is a leap year.

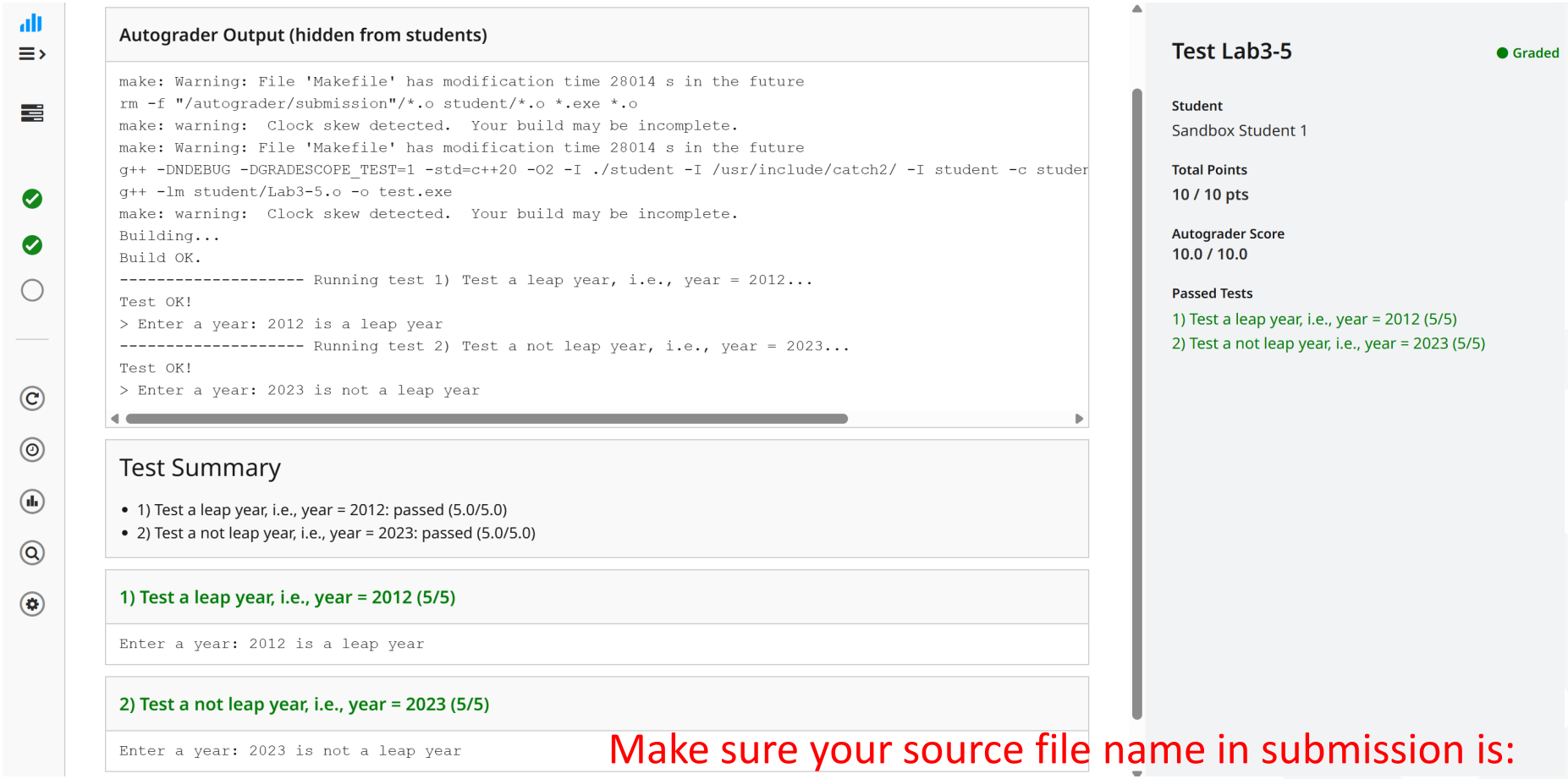
A year is a *leap year* if it is divisible by 4 but not by 100 or if it is divisible by 400. So you can use the following Boolean expression to check whether a year is a leap year:

```
(year % 4 == 0 && year % 100 != 0) || (year % 400 == 0)
```

```
#include <iostream>
using namespace std;

int main()
{
  cout << "Enter a year: ";
  int year;
  cin >> year;

  // Check if the year is a leap year
  bool isLeapYear =
    (year % 4 == 0 && year % 100 != 0) || (year % 400 == 0);

  // Display the result in a message dialog box
  if (isLeapYear)
    cout << year << " is a leap year" << endl;
  else
    cout << year << " is not a leap year" << endl;

  return 0;
}
```

TEST ON GRADESCOPE

https://www.gradescope.com/courses/1110587/assignments/6794773/submissions



Autograder Output (hidden from students)

```
make: Warning: File 'Makefile' has modification time 28014 s in the future
rm -f "/autograder/submission"/*.o student/*.o *.exe *.o
make: warning:  Clock skew detected.  Your build may be incomplete.
make: Warning: File 'Makefile' has modification time 28014 s in the future
g++ -DNDEBUG -DGRADESCOPE_TEST=1 -std=c++20 -O2 -I ./student -I /usr/include/catch2/ -I student -c studer
g++ -lm student/Lab3-5.o -o test.exe
make: warning:  Clock skew detected.  Your build may be incomplete.
Building...
Build OK.
-------------------- Running test 1) Test a leap year, i.e., year = 2012...
Test OK!
> Enter a year: 2012 is a leap year
-------------------- Running test 2) Test a not leap year, i.e., year = 2023...
Test OK!
> Enter a year: 2023 is not a leap year
```

Test Summary

- 1) Test a leap year, i.e., year = 2012: passed (5.0/5.0)
- 2) Test a not leap year, i.e., year = 2023: passed (5.0/5.0)

1) Test a leap year, i.e., year = 2012 (5/5)

```
Enter a year: 2012 is a leap year
```

2) Test a not leap year, i.e., year = 2023 (5/5)

```
Enter a year: 2023 is not a leap year
```

Test Lab3-5 ● Graded

Student
Sandbox Student 1

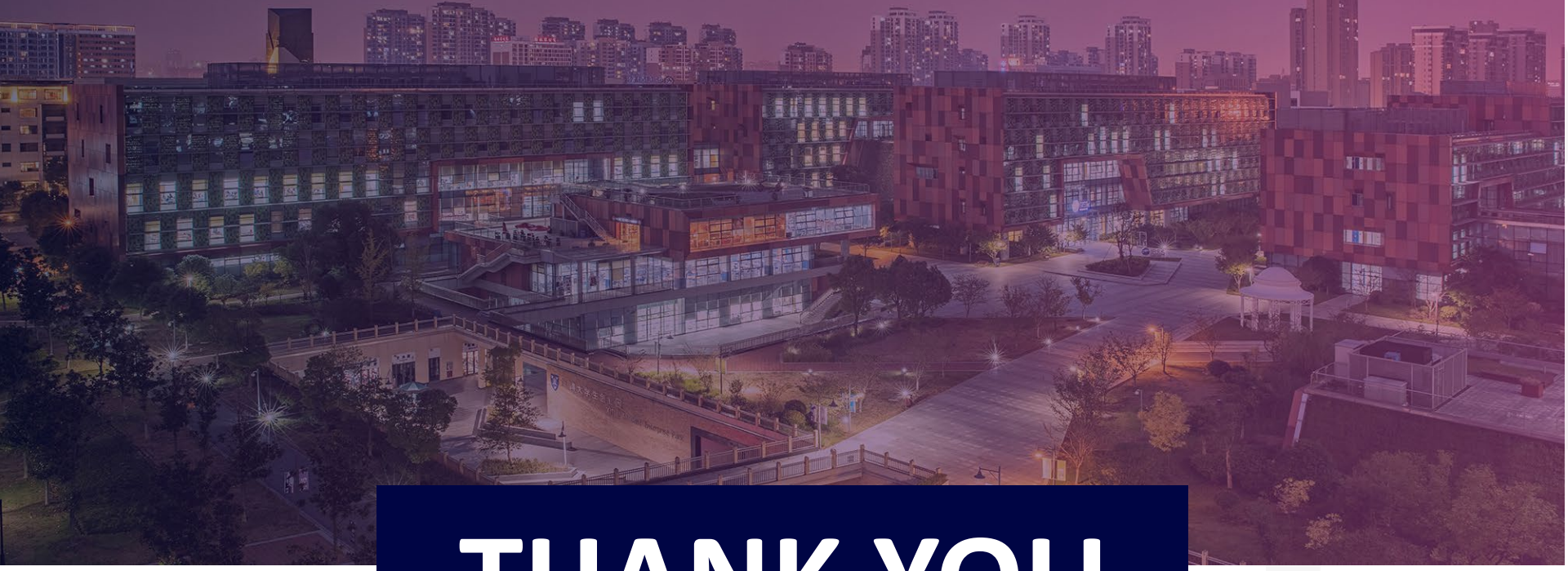
Total Points
10 / 10 pts

Autograder Score
10.0 / 10.0

Passed Tests
1) Test a leap year, i.e., year = 2012 (5/5)
2) Test a not leap year, i.e., year = 2023 (5/5)

Make sure your source file name in submission is:

Lab3-5.cpp



THANK YOU

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