CS100 Homework 1 (Fall Semester 2018)

Due time: 11:59 pm, October 14, 2018

Homework 1 consists of 3 problems. Please finish all of them independently.

1. Write a C program that reads the user input on temperature in degrees Fahrenheit, and then converts the temperature from degrees Fahrenheit into degrees Celsius. The formula of conversion is given as follows: Celsius = (5.0 / 9.0) * (Fahrenheit – 32).

Sample input and output sessions are given below (where user's input is in red color):

```
Enter the temperature in degree F: 45
Converted degree in C: 7.222222

Enter the temperature in degree F: 16
Converted degree in C: −8.888889
```

Please save your program code in a source file named "hw1_1.c".

2. Write a C program that computes the solutions for x and y in the following linear system of equations:

$a_1x + b_1y = c_1$
$a_2x + b_2y = c_2$

The solutions for x and y are given by:

$$x = \frac{b_2c_1 - b_1c_2}{a_1b_2 - a_2b_1} \quad \text{and} \quad y = \frac{a_1c_2 - a_2c_1}{a_1b_2 - a_2b_1}$$

The program reads from user the values of a_1, b_1, c_1, a_2, b_2 and c_2, and then it computes and prints the solutions. The variables have data type float. In your program, you may assume that the denominator $a_1b_2 - a_2b_1$ of the above equations is not zero. Hint: When the absolute value of $a_1b_2 - a_2b_1$ is less than a very small number, say 0.0001, your program can report an error that the denominator is 0. To calculate the absolute value you can use the fabs() function from the <math> library.

A sample input and output session is given below (user's input is in red):

```
Enter the values for a1, b1, c1, a2, b2, c2: 1 1 1 5 7 9
x = −1.000000 and y = 2.000000
```

Please save your program code in a source file named "hw1_2.c".

3. Write a C program that computes the value of e^x according to the following formula, where *x* is a real number and *n* is a positive integer:

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^n}{n!}$$

Some sample input and output sessions are given below:

```
Please enter the value of n: 10
Please enter the value of x: 0.9
Result = 2.459603

Please enter the value of n: 10
Please enter the value of x: -0.9
Result = 0.406570

Please enter the value of n: 5
Please enter the value of x: 0
Result = 1.000000
```

Please save your program code in a source file named "hw1_3.c".