1.

#*include* <iostream>

#*include* <conio.h>

#*include* <iomanip>

using namespace std;

*main*()

{

     char degree = 248;

     float firstTemp = -5.4, secondTemp = 124.67, thirdTemp = 305.15;// *Celius, Farenheight, Kelvin*

     float firstFarenheightConversion, firstKelvinConversion, firstRankineConversion;

     firstFarenheightConversion = ((1.8) \* firstTemp) + 32;

     firstKelvinConversion = (firstTemp) + 273.15;

     firstRankineConversion = firstFarenheightConversion + 459.67;

     cout *<<* *setprecision*(2) *<<* *fixed* *<<* "First Constant Value = " *<<* firstTemp *<<* degree *<<* "C\n"

*<<* degree *<<* "F = " *<<* firstFarenheightConversion *<<* degree *<<* "F\n"

*<<* degree *<<* "K = " *<<* firstKelvinConversion *<<* degree *<<* "K\n"

*<<* degree *<<* "R = " *<<* firstRankineConversion *<<* degree *<<* "R\n";

     float secondFarenheightConversion, secondKelvinConversion, secondRankineConversion;

     secondFarenheightConversion = 5 \* (secondTemp - 32) / 9;

     secondKelvinConversion = secondFarenheightConversion + 273.15;

     secondRankineConversion = secondTemp + 459.67;

     cout *<<* "\nSecond Constant Value = " *<<* secondTemp *<<* degree *<<* "F\n"

*<<* degree *<<* "F = " *<<* secondFarenheightConversion *<<* degree *<<* "C\n"

*<<* degree *<<* "K = " *<<* secondKelvinConversion *<<* degree *<<* "K\n"

*<<* degree *<<* "R = " *<<* secondRankineConversion *<<* degree *<<* "R\n";

     float thirdFarenheightConversion, thirdCelciusConversion, thirdKelvinConversion, thirdRankineConversion;

     thirdFarenheightConversion = (thirdTemp - 491.67) \* 5 / 9;

     thirdCelciusConversion = thirdFarenheightConversion;

     thirdKelvinConversion = ((1.8) \* thirdFarenheightConversion) + 32;

     thirdRankineConversion = thirdTemp \* 0.5555555556;

     cout *<<* "\nThird Constant Value = " *<<* thirdTemp *<<* degree *<<* "R\n"

*<<* degree *<<* "C = " *<<* thirdFarenheightConversion *<<* degree *<<* "C\n"

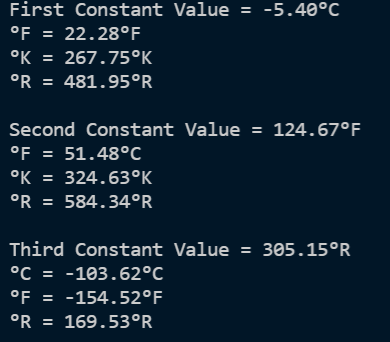
*<<* degree *<<* "F = " *<<* thirdKelvinConversion *<<* degree *<<* "F\n"

*<<* degree *<<* "R = " *<<* thirdRankineConversion *<<* degree *<<* "R\n";

*getch*();

}

Output:



In this program, we are tasked to convert temperature values to different units of temperature. To do so, we are given the equations to certain conversions such as:

However, we cannot use these equations for all the conversions that we are going to do. In this case, we are going to derive these 3 equations to find the other units.

We will use these derived equations in finding the missing conversions in the supplementary problem.

One more feature that I used in the code is using <iomanip>. I used iomanip to manipulate the output of the numbers in the terminal. In this case, I used setprecision(2) << fixed where it will only show 2 decimals, and adding fixed to it will only fix it to 2 decimals no matter how many decimals are there.

2.

#*include* <iostream>

#*include* <conio.h>

#*include* <cmath>

using namespace std;

*main*()

{

    cout *<<* "N\t2^n\n"

*<<* "0\t" *<<* *pow*(2, 0) *<<* "\n"

*<<* "1\t" *<<* *pow*(2, 1) *<<* "\n"

*<<* "2\t" *<<* *pow*(2, 2) *<<* "\n"

*<<* "3\t" *<<* *pow*(2, 3) *<<* "\n"

*<<* "4\t" *<<* *pow*(2, 4) *<<* "\n"

*<<* "5\t" *<<* *pow*(2, 5) *<<* "\n"

*<<* "6\t" *<<* *pow*(2, 6) *<<* "\n"

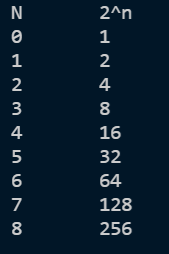
*<<* "7\t" *<<* *pow*(2, 7) *<<* "\n"

*<<* "8\t" *<<* *pow*(2, 8) *<<* "\n";

*getch*();

}

Output:



In the second supplementary problem, I used the library cmath to utilize the pow function. The pow function is used to indicate exponents in numbers. The format is as follows: pow(base, exponent), where the base is the base number and the exponent is the value raised to the base number. For example, we can write as pow(2, 4) as we write it in C++ programs.

#*include* <iostream>

#*include* <conio.h>

#*include* <cmath>

using namespace std;

*main*()

{

    float a, T, m, g;// *a = initial acceleration T - thrust in Newton m - mass in kg g - acceleration caused by gravity in m/s^2*

    T = 6e6;

    g = 9.81;

    m = 5e4;

    a = (T - (m \* g)) / m;

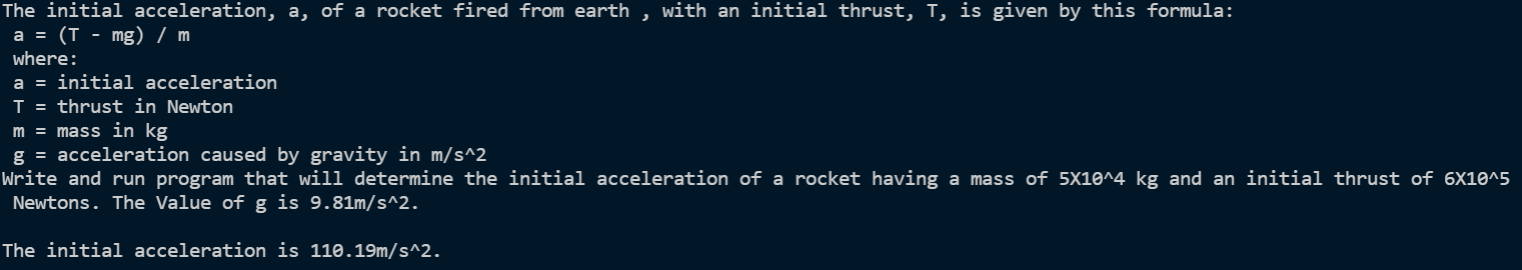
    cout *<<* "The initial acceleration, a, of a rocket fired from earth , with an initial thrust, T, is given by this formula:\n a = (T - mg) / m\n where:\n a = initial acceleration \n T = thrust in Newton\n m = mass in kg\n g = acceleration caused by gravity in m/s^2"

*<<* "\nWrite and run a program that will determine the initial acceleration of a rocket having a mass of 5X10^4 kg and an initial thrust of 6X10^5 Newtons. The Value of g is 9.81m/s^2.\n\n";

    cout *<<* "The initial acceleration is " *<<* a *<<* "m/s^2.";

*getch*();

}



In the last supplementary problem, we used scientific notations in indicating our values. We write scientific notations as , where a is the base number, e is denoted by , and b is the exponent. For example, we can write as *6e4.* The formula provided is used in finding the initial acceleration.