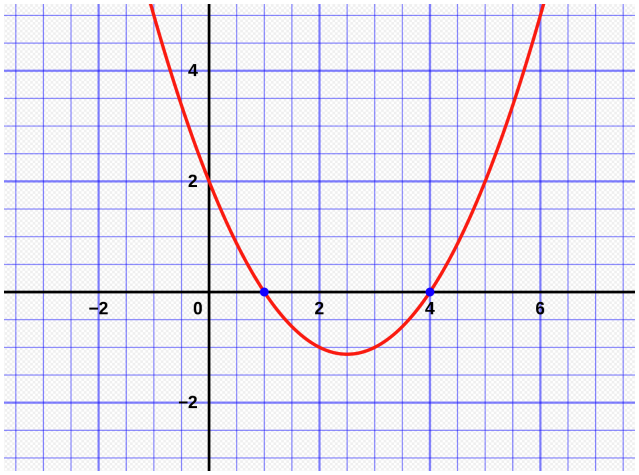
GSET - Programming with Mr. Hill - Summer 2021

Introduction to C++ - Tutorial 2 - The Quadratic Equation



Overview:

We are going to write a C++ program to solve the quadratic equation. After finding the solution, the program will output the results to the screen.

System Requirements:

- **Computer**: A computer is required to complete this tutorial. Any OS should work.
- **C++:** You can use the online C++ compiler (OnlineGDB) or a C++ compiler of your choice.

Problem Statement:

- Given: The coefficients a_2, a_1, a_0 of a second order polynomial in the form shown

  $$y = a_2x^2 + a_1x + a_0$$

- Find: The solution or roots x_1, x_2 of the equation

Program Minimum Requirements:

The program should accomplish the following tasks.

- The coefficients a_2, a_1, a_0 should be stored as variables in the program.
- The roots x_1, x_2 should be calculated by the program.
- The calculated roots x_1, x_2 should be printed to the screen.

Optional Advanced Features:

- The inputs a_2, a_1, a_0 should be read from the user during program execution
- The program should handle equations with real and complex solutions without error.
- The equation and solution should be plotted on an x-y graph.

Example Code:

1. This is the C style way to output text.

```
// Variables and Assignment - GSET - Summer 2021

#include <iostream> // inlcude the IO library

int main() // the main function
{

   float a2,a1,a0,x1,x2; // initialize the variables

   a2 = 10; // assign some values
   a1 = 25;
   a0 = 0;

   x1= ; // you must complete these lines
   x2= ; //

   std::cout<<"The roots are : "<<x1<<","<<x2<<std::endl; // print the results

   return 0; // end the main function
}
```

Part 3 - Testing:

1. Complete the C++ code to the solve the problem described.

2. Test your code with different inputs. Is the answer correct? How do you know? Are there certain inputs that do not work?

3. Save your code with the download button or use copy and paste. You can view and edit the code in any text editor. Also, save a copy of the program output for your tutorial summary.

Solution Code:

```
// Variables and Assignment - GSET - Summer 2021

#include <iostream> // inlcude the IO library
#include <math.h> // inlcude the math library

int main()
{

   float a2,a1,a0,x1,x2; // initialize the variables

   a2 = 1;
   a1 = -12;
   a0 = 34;

   x1= (-a1+sqrt(pow(a1,2)-4*a2*a0))/(2*a2); // calculate the positive root

   x2= (-a1-sqrt(pow(a1,2)-4*a2*a0))/(2*a2); // calculate the nega5tive root

   std::cout<<"The roots are : "<<x1<<","<<x2<<std::endl;

   return 0;
}
```

Tutorial Complete:

Congratulations, after completing *Tutorial 2 - Quadratic Equation*, you have begun learning to program in C++! You are now ready to start learning about more complex data structures and program flow.

Tutorial Summary:

Write a brief summary of what you accomplished and what you struggled with the most.

Include the following items in the summary:

- a copy of the output of your program
- a description of what the program does and how to use it

Submission on Teams:

Use the appropriate shared folder on Teams to submit your program and summary. Submit the fol1owing items with your TNTech username in the filenames as shown below.

Files for Tutorial 1 (TNTech Username : twhill21)

- Tutorial Summary: **twhill21_summary2.txt**
- C++ Source Code: **twhill21_tutorial2.cpp**