Assignment-1: Milestone-1

CS346: Software Engineering Laboratory

Assignment-1 Report

Task:

To develop a software tool to solve any given quadratic equation with real coefficients

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1 Task Description

The task requires me to build **a software tool to solve any given quadratic equation with real coefficients**, along with the following add-ons:

- All the cases should be handled.
- Visualization should be provided for each solution step.

2 Assumptions

After reading the problem statement, there are a few questions that are **left unanswered**, which are listed below along with the assumption I will follow while developing the tool:

- The *input* is not defined. I assume the quadratic equation to be solved as $ax^2 + bx + c$ and expect a, b, and c as the *input*.
- The input range is not defined, I will consider the input to be an **integer** ranging from **-1000** to **1000** with both sides **inclusive**.
- It is mentioned to handle *all cases*, but the set of *all cases* is not defined. I will handle the following cases:
  - **Real roots**: Real roots are shown with a **with a precision of three decimal places**.
  - **Imaginery roots**: Imaginary roots **aren't shown**, instead, the message *No real roots exist for the given equation* is shown.
- The kind of visualizations and *output* expected is not defined. I will define what visualizations will the software support and what would be the *output* in the Deliverables section.

3 Possible Solution

The problem is well known and can be solved as follows:

- Check whether the input is valid or not.
- If the input is not valid, inform the user of the same and exit the form.
- If the input is valid, check whether the discriminant is non-negative or not.
- If the discriminant is not non-negative, display the message *No real roots exist for the given equation*
- If the discriminant is non-negative, display the roots correct up to three decimal places of the equation $ax^2 + bx + c = 0$.
- Display the calculations through the method of completing the square.
- Display the graph of the function.

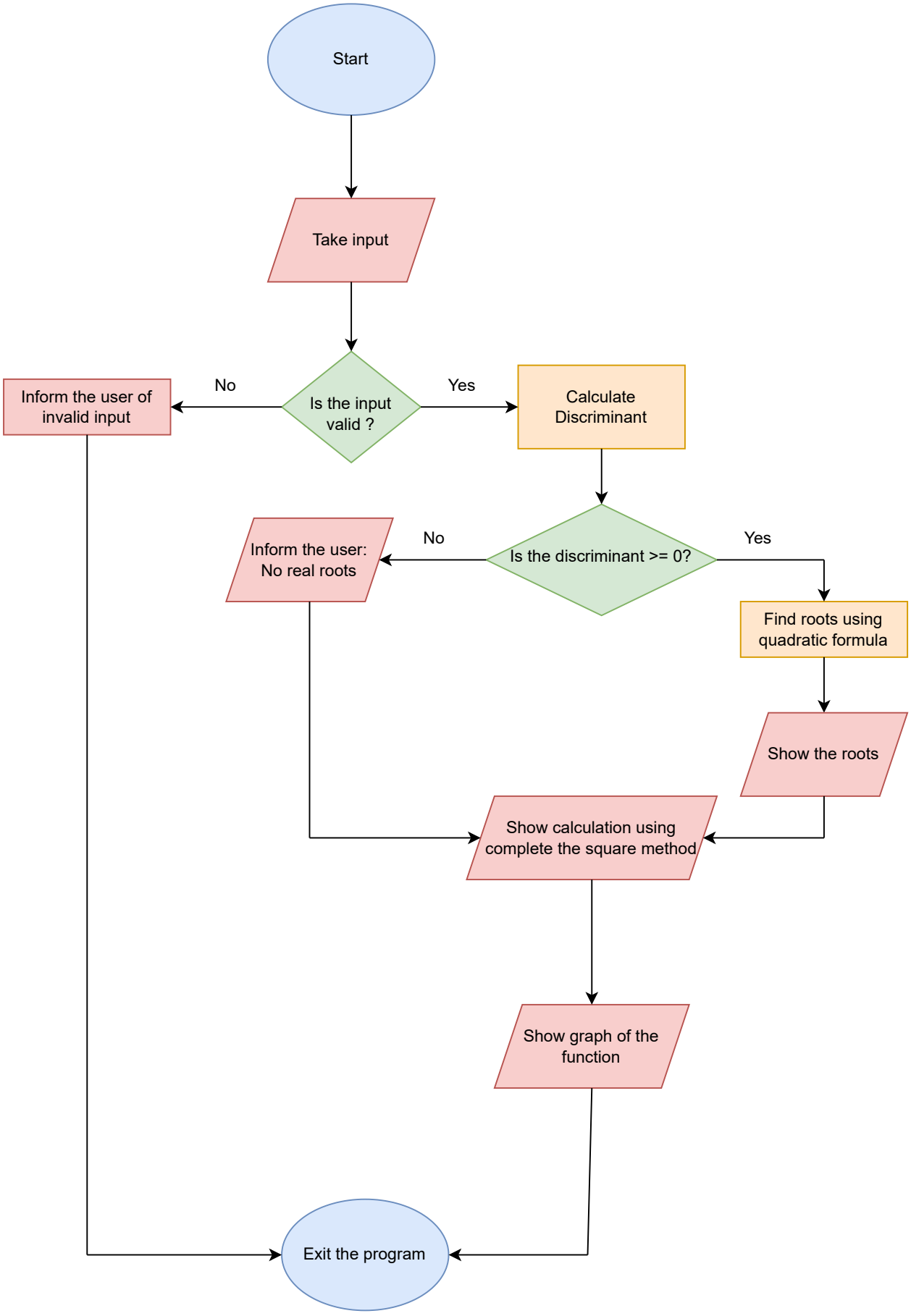

Figure 1: Proposed solution

4 Deliverables

The tool will be a **Windows Forms Application**(WFA) to solve **quadratic equations of the type** $ax^2 + bx + c$ equipped with the following:

4.1 Input

The input for the tool consists of the following:

- An input box for taking the input a.
- An input box for taking the input b.
- An input box for taking the input c.
- A clickable button to initiate the calculations.

4.2 Output

The output for the tool consists of the following:

- A message box showing the roots precise up to **three decimal places** if the roots are real, or a message reading *No real roots exist for the given equation* if the roots are imaginary.
- Visual representations to support the roots being shown in the output.

4.3 Visualizations

Prima facie, I think of the following visualizations to help emphasize the output:

- A zoomable graph of the function $ax^2 + bx + c$.
- Calculations shown using the method of completing the square in a message box.
- Appropriate music to enhance the user experience.

4.4 Expected software

Find the primary user interface of the proposed tool below:

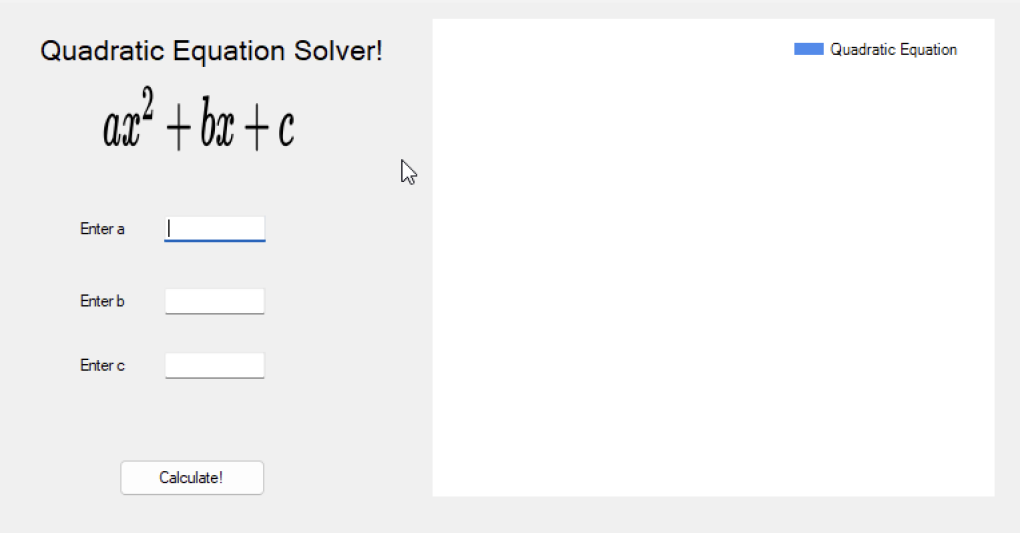

Figure 2: Input

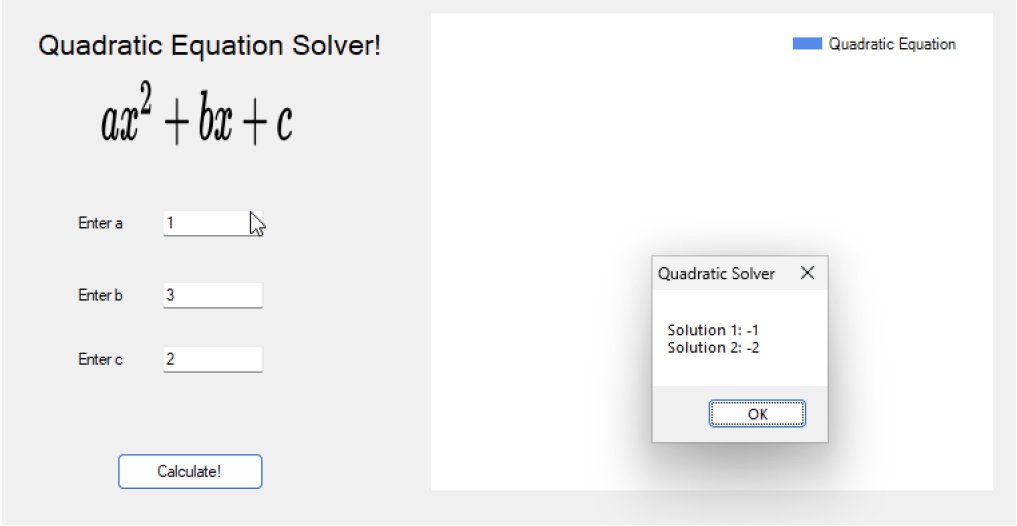

Figure 3: Output: Roots

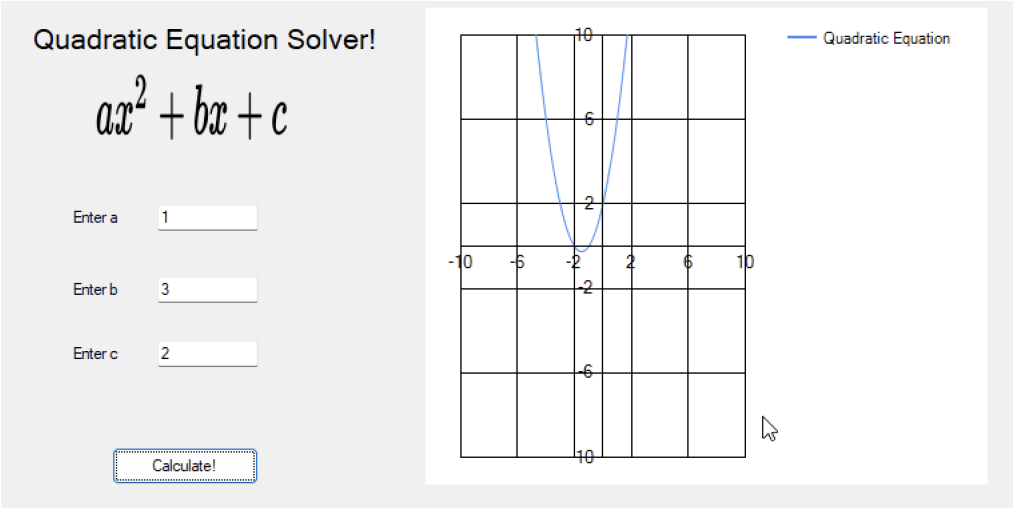

Figure 4: Output: Graph