Lab # 2

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CPSC 1150 - W01
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Lab Title: Quadratic Formula Lab
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Program Quadratic Formula
File Name: Lab2.java
Purpose: Calculate roots, x1 and x2, of a quadratic equation: $ax^2 + bx + c = 0$
where a, b, and c are parameters or the equation.
Input: a, b and c
Output: x1 and x2

Technical Information:
(You should fill the following information based on compiler and computer you are using).
Compiler: IntelliJ IDEA Community Edition 2023.1.1
Computer: (R) Core(TM) i7-10870H CPU @ 2.20GHz 2.21 GHz, 16 GB of RAM
Operating System: Windows 10 Home Single Language
Language: Java

Program Logic (Pseudocode)

Algorithm: find the roots of a quadratic equation in the form of: $ax^2 + bx + c = 0$

START

1. a, b, c ⟵ input

2. if a = 0 then

    solve the linear equation bx + c =0

    x ⟵ -c/b

    END

3. delta ⟵ b^2 - 4ac

4. if delta < 0 then

    equation has no real roots

    END

5. if delta = 0 then

    two equal roots

    $x1, x2 \leftarrow \frac{-b}{2a}$

    END

7. otherwise

    equation has two roots

    $x1 \leftarrow \frac{-b-\sqrt{delta}}{2a}$

    $x2 \leftarrow \frac{-b+\sqrt{delta}}{2a}$

END

Generate your test cases based on the specifications in your lab assignment. Follow following format for each test case: (Refer to external document of your previous lab)

purpose
input
output
expected value
passed or failed

Test Cases:

Test case 1: a and b both are 0
a = 0
b = 0
c = 1
Output: Not a valid input. Try again.
Expected Value: Not a valid input. Try again.
Passed

Test case 2: only a is 0
a = 0
b = 1
c = 1
Output: Linear Equation
x = -1.0
Expected Value: Linear equation. x = -1
Passed

Test case 3: discriminant is 0
a = 1
b = 2
c = 1
Output: Double roots.
x1 = x2 = -1.0
Expected Value: Double roots. x1 = x2 = -1
Passed

Test case 4: discriminant is positive
a = 1
b = -7
c = 12
Output: Two real roots
x1 = 4.0
x2 = 3.0
Expected Value: Two real roots. x1 = 4, x2 = 3
Passed

Test case 5: discriminant is negative
a = 3
b = 1
c = 1
Output: No real roots.
Expected Value: No real roots.

Passed