Programming Assignment #8: Objects & Classes

Program Problem: Demonstrate your understanding of Programmer written class and creation of objects.

Write: Design a class named QuadraticEquation for a quadratic equation $ax^2 + bx + c$. The class contains:

- Private data fields a, b, and c that represent three coefficients.
- A constructor with the arguments for a, b, and c.
- Three getter methods for a, b, and c.
- A method named getDiscriminant() tat returns the discriminate ($b^2 - 4ac$).
- The methods named getRoot1() and getRoot2() for returning the two roots of the equation

  r1 = $\frac{-b+\sqrt{b^2-4ac}}{2a}$ and r2 = $\frac{-b-\sqrt{b^2-4ac}}{2a}$

These methods are useful only if the discriminant is nonnegative. Let these methods return 0 if the discriminant is negative.

Draw the UML diagram for the class then implement the class. Write a test program that prompts the user to enter values for a, b, and c and displays the result based on the discriminant. If the discriminant is positive, display two roots. If the discriminant in 0, display one root. Otherwise display "The equation has no root."

Documentation: You must use a readable, logical, and coherent set of style and formatting rules. You are to stick to the "structured approach" in programming**.** Be sure to comment your code in addition to the required header. Each submission must have a block comment area that includes: Your first and last name, program exercise title, program due date, and the program description.

Submission Details: All submissions are electronic. When you turn in a programming assignment, you must send me a compilable and correctly working copy of the assigned program source code. I will, at my discretion, compile and run (on my own test input) the programs you submit electronically. This is a part of my grading procedure. Your program must work. That means it must compile correctly, run according to specifications, and give correct results. Generally, a program that works will receive at least 40-50 percent of full credit. The rubric used for scoring is visible to you so please review it before you submit your assignment. Submit your source file for your test program this means you are giving me your **<lastnameObjects.java>,** and your class **QuadraticEquations.java>** file not a link to an online compiler, text file, or executable file. In addition to your java file and class file, include a word document that has your UML diagram (this should be the first page) and screen snips for your test runs name that file **<lastnameObjects.docx>.** *Your testing log needs to show the following tests:*

Enter a, b, c: 1.0 3 1 ↵*Enter*

The equation has two roots: -0.381966 and -2.61803

Enter a, b, c: 1 2.0 1 ↵*Enter*

The equation has one root: -1.0

Enter a, b, c: 1.0 3 1 ↵*Enter*

The equation has no real roots

For full credit, your program must also meet the following criteria:

- Good design, including good algorithms.
- Good form, including documentation, and readability.
- Adequate testing, especially the testing of data boundaries and special cases.

You need to do a good job on all the criteria to receive an "A" on your program.