Computer Science I   CSCI141
Computing Roots of Quadratic Formulae Homework

1   Problem

Write a function that computes the real roots of a quadratic equation.

2   The Approach

Quadratic formulae are second-order polynomials of the form $ax^2 + bx + c$. The roots of the polynomial are the values of x that cause the polynomial to evaluate to 0. The solution has a closed form:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The problem is that the number of roots can vary, depending on the value of $b^2 - 4ac$. If it's positive, there are two roots. If it's zero, there is one root. If it's negative, there are no roots. (In this assignment we won't worry about complex numbers or the case where $a = 0$.)

Your function should be called `quadraticRoots` and it should take three numerical parameters, `a`, `b`, and `c`.

Here is what the output should look like for different cases.

Call `quadraticRoots( 1, 0, 0 )`:

```
Equation:  1x^2 + 0x + 0 = 0
One root.
x = 0.0
```

Call `quadraticRoots( 2, -11, -21 )`:

```
Equation:  2x^2 + -11x + -21 = 0
Two roots.
x = 7.0
x = -1.5
```

Call `quadraticRoots( 4, 1, 4 )`:

```
Equation:  4x^2 + 1x + 4 = 0
No roots.
```

Call your program file file **roots.py**.

3   Programming Tips

3.1   Square Root

Remember that the square root function `sqrt` is in the `math` module, so be sure to import it.

3.2   Simple `print` Formatting

Normally, if you execute a print statement like

`print( 5, "x", 2 )`

your output looks like

`5 x 2`

If you want there to be no spaces between the values printed, add a value for a special, named parameter `sep`:

`print( 5, "x", 2, sep="" )`

4   Testing

Include in the file about 10 tests that try different combinations of `a`, `b`, and `c` that trigger different kinds of results.

5   Evaluation and Grading Rubric

- 45% Formula calculation is correct
- 45% All three cases (0, 1, or 2 roots) work correctly in that they output appropriate information for each case (15% per case).
- 10% Style rules are followed

5.1   Submission

Put your program code with the appropriate documentation into a file called **roots.py** and submit that file to the MyCourses dropbox for this assignment.