**package** algorithms;

// CS 225A, 9-2-08

/\* Lab 1 Assignment: Use Eclipse to create and run the Quadratic class

 \* given below. A Quadratic is a quadratic expression in a single variable

 \* with real (double precision) coefficients. The basic Quadratic class

 \* has a constructor, a toString method, and a method "roots" for finding

 \* the real roots of the quadratic expression (if any).

 \*/

**public** **class** Quadratic {

 // Data fields

 // A Quadratic object "knows" its three coefficients.

 **private** **double** a, b, c;

 // Constructor

 // Input: The desired coefficients d, e, f, with d != 0

 // Result: Creates the Quadratic object corresponding to d\*x^2 + e\*x + f

 **public** Quadratic(**double** d, **double** e, **double** f)

 {

 a = d;

 b = e;

 c = f;

 }

 // Converts this Quadratic to its String representation

 // Input: void

 // Returns: "ax^2 + bx + c"

 **public** String toString()

 {

 **return** a + "x^2 + " + b + "x + " + c;

 }

 // Finds the real roots of this Quadratic

 // Input: void

 // Returns: a 1-by-2 array containing the real roots of this Quadratic function

 // Note: If there are no real roots, both entries of the returned array will

 // have the value Float.Nan (not a number)

 **public** **double**[] roots()

 {

 **double**[] r = **new** **double**[2];

 **double** d = b\*b - 4\*a\*c; // discriminant

 **if**(d<0)

 r[0] = r[1] = Float.*NaN*;

 **else**

 {

 r[0] = (-b-Math.*sqrt*(d)/(2\*a));

 r[1] = (-b+Math.*sqrt*(d)/(2\*a));

 }

 **return** r;

 }

 // Main method to exercise the Quadratic class

 **public** **static** **void** main(String[] args) {

 Quadratic f = **new** Quadratic(1.0, 0.0, 5.0);

 Quadratic g = **new** Quadratic(0.005, 10.8, 5.2);

 System.*out*.println("f = " + f.toString());

 System.*out*.println("g = " + g.toString());

 **double**[] rootsF = f.roots();

 **double**[] rootsG = g.roots();

 System.*out*.print("The real roots of " + f.toString() + " are ");

 System.*out*.println(rootsF[0] + " and " + rootsF[1]);

 System.*out*.print("The real roots of " + g.toString() + " are ");

 System.*out*.println(rootsG[0] + " and " + rootsG[1]);

 }

}