```
 1: /*global
 2:    alert, console
 3: */
 4: /*jslint
 5:    vars: true
 6: */
 7: /*jstrap
 8:   console, ctx, save
 9: */
10: var canvas, ctx;
11:
12: //Plot the x and y axis and tick marks
13: function plotAxis(canvas, ctx) {
14:     "use strict";
15:     var i;
16:     ctx.save();
17:     ctx.translate(canvas.width / 2, canvas.width / 2);
18:
19:     //x-axis
20:     ctx.beginPath();
21:     ctx.lineTo(-canvas.width / 2, 0);
22:     ctx.lineTo(canvas.width / 2, 0);
23:     ctx.stroke();
24:
25:     //y-axis
26:     ctx.beginPath();
27:     ctx.lineTo(0, -canvas.height / 2);
28:     ctx.lineTo(0, canvas.height / 2);
29:     ctx.stroke();
30:
31:     //tick marks
32:     //Draws in the positive direction and negative direction
33:     //at the same time.
34:     //Don't have to fiddle with endpoints this way.
35:     for (i = 0; i < canvas.width / 2; i = i + 20) {
36:         ctx.beginPath();
37:         ctx.lineTo(i, -10);
38:         ctx.lineTo(i, 10);
39:         ctx.stroke();
40:         ctx.beginPath();
41:         ctx.lineTo(-i, -10);
42:         ctx.lineTo(-i, 10);
43:         ctx.stroke();
44:     }
45:     for (i = 0; i < canvas.height / 2; i = i + 20) {
46:         ctx.beginPath();
47:         ctx.lineTo(-10, i);
48:         ctx.lineTo(10, i);
49:         ctx.stroke();
50:         ctx.beginPath();
51:         ctx.lineTo(-10, -i);
52:         ctx.lineTo(10, -i);
53:         ctx.stroke();
54:     }
55:     ctx.restore();
56: }
57: //Calcuate the roots with the quadratic formula
58: function displayRoot(root1, root2, a, b, c) {
59:     "use strict";
60:     var coeff2 = Math.pow(b, 2) - 4 * a * c;
61:     if (coeff2 < 0) {
62:         //Imaginary roots
63:         root1.innerHTML = "Imaginary root";
64:         root2.innerHTML = "Imaginary root";
65:     } else {
66:         //Real roots
67:         root1.innerHTML = "Root1:" + (-b + Math.sqrt(coeff2)) / (2 * a);
68:         root2.innerHTML = "Root2:" + (-b - Math.sqrt(coeff2)) / (2 * a);
69:     }
70: }
```

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 71:
 72: //Plot the parabola
 73: function plotParabola(canvas, ctx, a, b, c) {
 74:     "use strict";
 75:     var i, x, y;
 76:     ctx.save();
 77:     ctx.translate(canvas.width / 2, canvas.height / 2);
 78:     ctx.beginPath();
 79:     for (x = -canvas.width / 2; x <= canvas.width / 2; x = x + 1) {
 80:         y = a * Math.pow(x, 2) + b * x + c;
 81:         //Draw it right side up.
 82:         ctx.lineTo(x, -y);
 83:     }
 84:     ctx.stroke();
 85:     ctx.restore();
 86: }
 87: //Event handler called from the webpage
 88: function plot() {
 89:     "use strict";
 90:     var root1 = document.getElementById("root1");
 91:     var root2 = document.getElementById("root2");
 92:     var a = Number(document.getElementById("RX78").value);
 93:     var b = Number(document.getElementById("RX79").value);
 94:     var c = Number(document.getElementById("GN0000").value);
 95:
 96:     ctx.clearRect(0, 0, canvas.width, canvas.height);
 97:     plotAxis(canvas, ctx);
 98:     plotParabola(canvas, ctx, a, b, c);
 99:     displayRoot(root1, root2, a, b, c);
100:
101: }
102: //setup, draws the axis initially.
103: function setup() {
104:     "use strict";
105:     canvas = document.getElementById("plottingSurface");
106:     ctx = canvas.getContext("2d");
107:     plotAxis(canvas, ctx);
108:     console.log("Also sprach Zarathustra: Ein Buch fÃ¼r Alle und Keinen");
109: }
```