

## Answer on Question #78659 – Math – Analytic Geometry

### Question

Find the locus of the point, the absolute value of the difference of the distances of which from the points (2,2) and (0,0) is 2. Identify the curve represented by the locus.

### Solution

Choose some point having coordinates (x, y).

The distance between this point and (2, 2) is given by

$$\sqrt{(x - 2)^2 + (y - 2)^2}$$

The distance between point (x, y) and (0, 0) is given by

$$\sqrt{(x - 0)^2 + (y - 0)^2} = \sqrt{x^2 + y^2}$$

The absolute value of the difference of the distances is 2

$$\left| \sqrt{(x - 2)^2 + (y - 2)^2} - \sqrt{x^2 + y^2} \right| = 2$$

$$\sqrt{(x - 2)^2 + (y - 2)^2} - \sqrt{x^2 + y^2} = 2$$

$$\sqrt{(x - 2)^2 + (y - 2)^2} = 2 + \sqrt{x^2 + y^2}$$

$$x^2 - 4x + 4 + y^2 - 4y + 4 = 4 + 4\sqrt{x^2 + y^2} + x^2 + y^2$$

$$\sqrt{x^2 + y^2} = -x - y + 1$$

$$x^2 + y^2 = x^2 + y^2 + 2xy - 2x - 2y + 1, -x - y + 1 \geq 0$$

$$2y(x - 1) = 2x - 1$$

$$y = \frac{2x - 1}{2(x - 1)}, x \neq 1$$

$$\sqrt{(x - 2)^2 + (y - 2)^2} - \sqrt{x^2 + y^2} = -2$$

$$\sqrt{(x - 2)^2 + (y - 2)^2} = -2 + \sqrt{x^2 + y^2}$$

$$x^2 - 4x + 4 + y^2 - 4y + 4 = 4 - 4\sqrt{x^2 + y^2} + x^2 + y^2, x^2 + y^2 \geq 2$$

$$\sqrt{x^2 + y^2} = x + y - 1$$

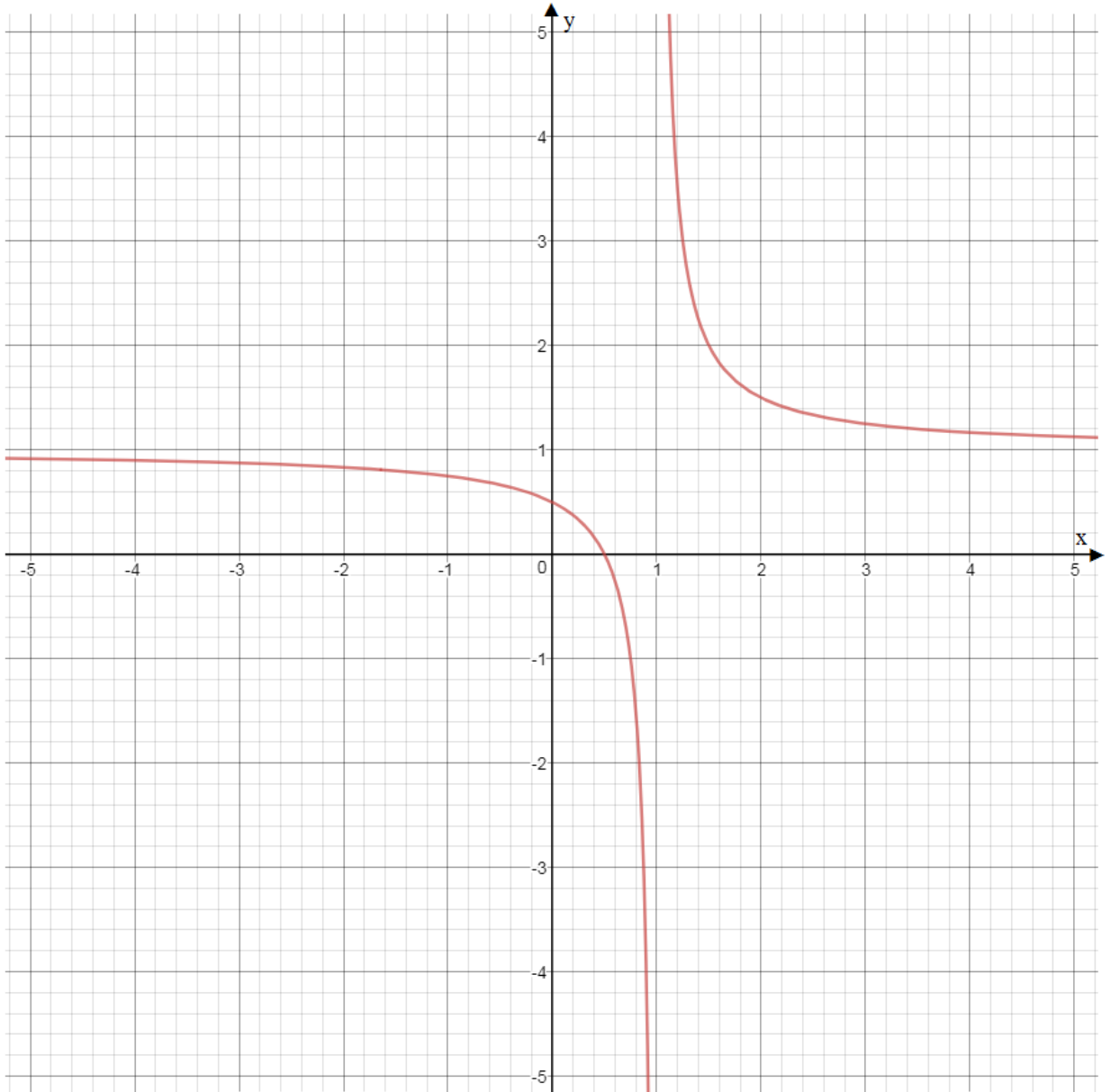
$$x^2 + y^2 = x^2 + y^2 + 2xy - 2x - 2y + 1, x + y - 1 \geq 0$$

$$2y(x - 1) = 2x - 1$$

$$y = \frac{2x - 1}{2(x - 1)}, x \neq 1$$

A hyperbola is the locus of a point which moves in the plane in such a way that the absolute value of the difference of its distances from two fixed points in the plane is constant.

Graph of the locus:



Answer provided by <https://www.AssignmentExpert.com>