The parameterized equation for a line segment through the points and is:

Where:

And the parameter t ranges over the values 0.0 to 1.0. For example, when , the equations give and so the equations return the first end point. When , the equations give and so the equations return the second end point.

The general equation for a conic section is:

Depending on the values of A, B, C, D, E, and F, this might be an ellipse (possibly even a circle), parabola, or hyperbola.

If you plug the equations for the line into the equation for the conic section, you get:

If you multiply out the things inside parentheses, you get:

Now grouping the , , and constant terms gives you:

This is a quadratic equation of the form:

Where:

Note that all of the values in the definitions of *a*, *b*, and *c* are just numeric values that the program knows from the definitions of the particular conic section and line segment. That means you can plug them into the quadratic equation to find the values of that satisfy the equation:

The value inside the radical is called the *determinant*. The number of real solutions to the equation depends on whether the determinant is positive, negative, or zero:

* determinant < 0: There are no real solutions.
* determinant = 0: There is one solution.
* determinant > 0: There are two solutions.