

1.7 Solve Linear-Quadratic Systems – Lesson

MCR3U

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DO IT NOW!

Solve the following linear system using the method of substitution:

$$y = 3x + 7$$

$$y = 2x - 5$$

Recall: solving a linear system means to find the point of intersection (POI)

Method of Substitution: solving a linear system by substituting for one variable from one equation into the other equation.

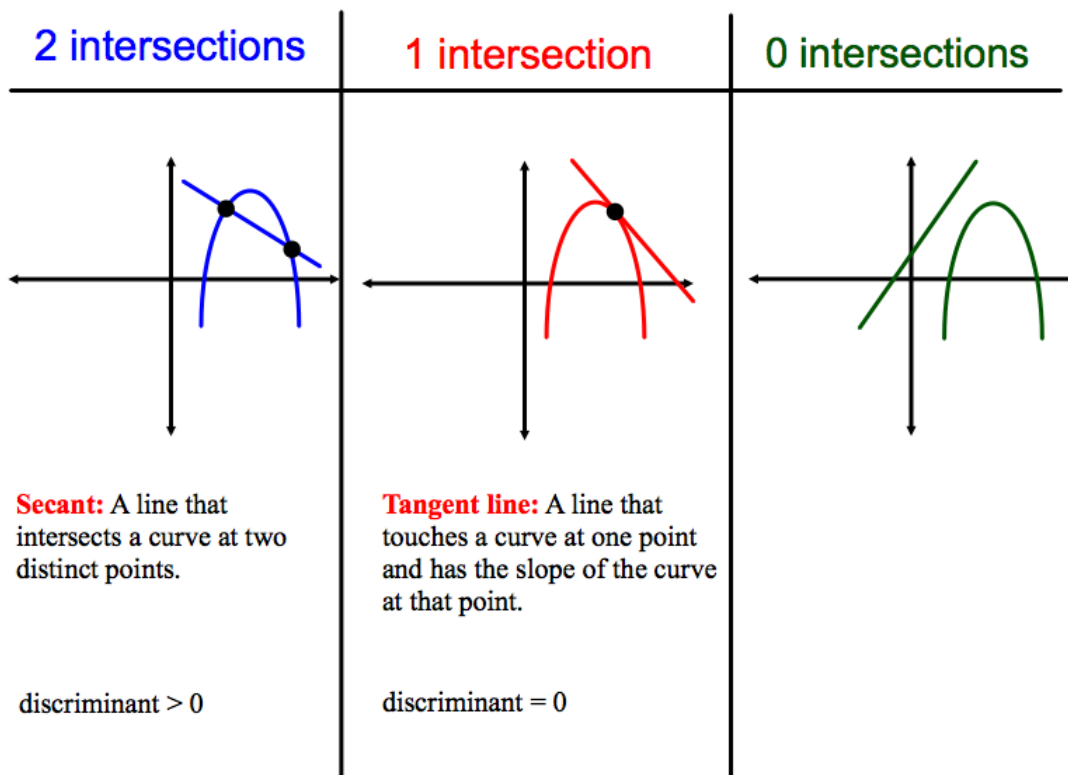
Steps to Solving A Linear-Quadratic System

1. Set equations equal to each-other

$$\text{Line} = \text{Parabola}$$

2. Rearrange to set the equation equal to zero
3. Solve for x by factoring or using the QF (the solution will tell you for what value of x the functions have the same y value)
4. Plug this value of x back in to either of the original functions to solve for y .

Possible solutions for a linear-quadratic system:



Example 1:

a) How many points of intersection are there for the following system of equations?

$$f(x) = \frac{1}{2}x^2 + 2x - 8$$

$$g(x) = 4x - 10$$

b) Solve the linear-quadratic system (give exact answers)

Example 2: Solve the following linear-quadratic system

$$y = 3x^2 + 21x - 5$$

$$y = 10x - 1$$

Part 4: Application

Example 3: If a line with slope 4 has one point of intersection with the quadratic function

$y = \frac{1}{2}x^2 + 2x - 8$, what is the y-intercept of the line? Write the equation of the line in slope y-intercept form.

Recall: equation of a line is $y = mx + b$ where b is the y-intercept and m is the slope.

Recall: for a lin-quad system to have 1 solution, the discriminant must be zero.