Solving a System of Quadratic – Linear Equations

- There are 3 possible scenarios when solving a quadratic-linear system.
- Unlike a Linear-Linear and Quadratic-Quadratic systems that can have infinitely many solutions, Quadratic-Linear system cannot have infinitely many solutions.

1. **There are no real solutions to the system**

- When graphed, the parabola and the line never intersect
- When solving algebraically resulting equation does not have real solutions.

Examples:

Solve:

$$3x^2 + 10 = y$$
$$y = -0.5x + 5$$

2. **There is one solution to the system**

    o When graphed, the parabola and the line either touch (the line is a tangent line to the parabola) or the graphs intersect once.

Examples:

Solve:

$$y = -(x - 4)^2 + 3$$

$$2x - 4 = y$$

3. **There are two solutions to the system**

   ○ When graphed, the parabola and the line intersect twice.
   ○ The line is a secant line to the parabola.
   ○ When solving algebraically, the resulting equation has two solutions (the discriminant is positive).

Examples:

Solve:

$$y = -3x^2 + 6x + 2$$

$$y - 3 = 0.75(x - 1)$$