First, let's take concrete examples of forms of our parabolic equations.

$$y = 4x^2 + x + 2$$
$$y = 7x^2 + x + 2$$

Next, set the two equations equal to each other.

$$4x^2 + x + 2 = 7x^2 + x + 2$$

Collect like terms.

$$0 = 3x^2$$

Solve for x.

$$x^2 = 0$$
$$\sqrt{x^2} = \sqrt{0}$$

$$x = 0$$

Now that we have a value for x, we can go back into both of our original equations and get compute a value for y.

$$y = 4(0)^2 + 0 + 2$$

$$y = 0 + 0 + 2$$
$$y = 2$$

and

$$y = 7(0)^2 + 0 + 2$$

$$y = 0 + 0 + 2$$
$$y = 2$$

Therefore, we now have the point of intersection between two points is (0,2).

So we have proven there can be a point of intersection between two lines of the form $y = ax^2 + x + 2$. Now, lets see if we can find a general form of this solution to the intersection between all the different forms.

So take two general forms such as

$$y = ax^2 + x + 2$$
$$y = bx^2 + x + 2$$

Set the two equations equal to each other and begin to collect like terms.

$$ax^2 + x + 2 = bx^2 + x + 2$$

$ax^2 = bx^2$

$0 = bx^2 - ax^2$

$0 = x^2(b - a)$

$0 = x^2$

$\sqrt{0} = \sqrt{x^2}$

$0 = x$

Once again plug this x value into our original equations to find that $y = 2$.

This shows us that for any value of "a" in our equation, the point of intersection is independent of this value because as we solve for x, the values a and b no longer factor into the solution.