**3.8 – Linear-Quadratic Systems**

MCR3U Name:

**Goals:**

* Determine the number of POIs of a linear-quadratic system and what the POI(s) are.
* Determine the value for an unknown if you know the number of POIs.

To solve a linear- quadratic system, this requires determining the Points Of Intersection (POIs). This can be done by:

1. Graphing – graph the linear and quadratic relationship and see if and where they intersect
2. Algebraically
* Set the two expressions equal to each other
* Rearrange to set equal to zero
* Solve the resulting quadratic
* Determine if both solutions are admissible (for real-life application questions)

**Example 1: Determining the # of POIs Algebraically**

1. Determine the # of POIs of $f\left(x\right)=4x^{2}+x-3$ and $g\left(x\right)=5x-4$

**Important:**

The **discriminant** tells us the number of POIs.

0 POIs 🡪 $b^{2}-4ac<0$

1 POI 🡪 $b^{2}-4ac=0$

2 POIs 🡪 $b^{2}-4ac>0$

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1. What are the POI(s)? Show algebraically and graphically.



**Example 2: Given the # of POIs, solve for an unknown value**

**Important:**

When dealing with inequalities, you can add/subtract/multiply/divide like an equal sign, with just one exception.

If you multiply or divide by a **negative**, this **flips the direction** of the inequality.

Given $f\left(x\right)=3x^{2}-4x+9$ and $g\left(x\right)=9x+k$, determine the value(s) of k if the two lines must intersect in 2 locations.