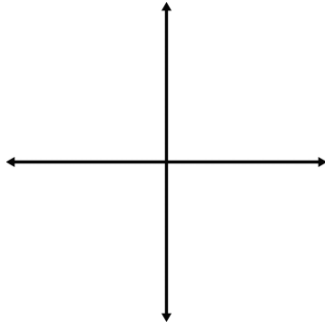# 3U – C4 – day 4 Linear Quadratic Systems

Recall Systems of Equations from Grade 10 …

Example #1 Determine the Point of Intersection of $f(x) = -2x + 11$ and $g(x) = 3x - 4$

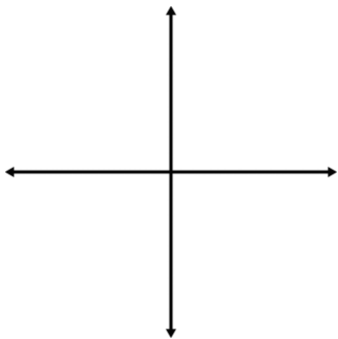**Graph both functions first on NSpire…**   **Now use Algebra to find the POI**

Example #2 Determine the Point of Intersection between $f(x) = x^2$ and $g(x) = x + 2$.

Graph both functions first on NSpire…   **Now use Algebra to find the POI**

Example #3 Determine the Point of Intersection between $f(x) = x^2 + 1$ and $g(x) = 2x + 4$

Example #4 Determine using algebra the ***number of Points of Intersections*** of the system …

$$f(x) = 3x^2 + 12x + 14 \quad \text{and} \quad g(x) = 2x - 8 \quad .$$

Example #5 Determine the value of k so there is one Point of Intersections of the system …

$$f(x) = 3x^2 + 12x + 14 \quad \text{and} \quad g(x) = 4x + k \quad .$$

Example #6

Adam has decided to celebrate his birthday going skydiving. He loves to freefall so he will wait for some time before opening his parachute.

His height after jumping from the airplane during the freefall can be modelled by the quadratic function $h_1(t) = -4.9t^2 + 5500$, where t is the time in seconds and h_1 is the height above the ground, in metres, t seconds after jumping out.

After he releases his parachute, he begins falling at a constant rate. His height above the ground can be modelled by the linear function $h_2(t) = -5t + 4500$.

When did Adam open his parachute and how high was he?

Graph the functions using technology to understand the problem. *Hint – Adjust the window settings of your graph.* Sketch the graph below. Then provide an algebraic solution.
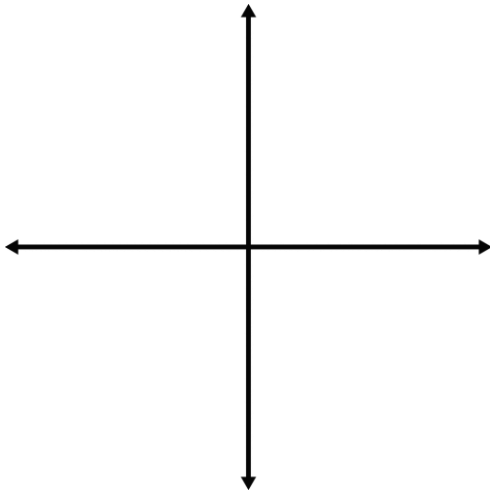
Example #7

The height of a baseball, after is is tossed out of a window is modelled by the function

$$h(t) = -5t^2 + 20t + 16,$$

where t is the time in seconds since it was tossed and h is the height in metres.

A boy shoots at the baseball with a paintball gun. He shoots at the exact same time as the baseball is thrown. The trajectory of the paintball is given by the function

$$g(t) = 3t + 4,$$

where t is the time in seconds since it was shot and h is the height in metres.

Will the paintball hit the baseball?
If so, when? At what height?