

Thursday and Friday: In class assignment

↳ Mostly 3.5

↳ a little bit of 3.6 + 3.8

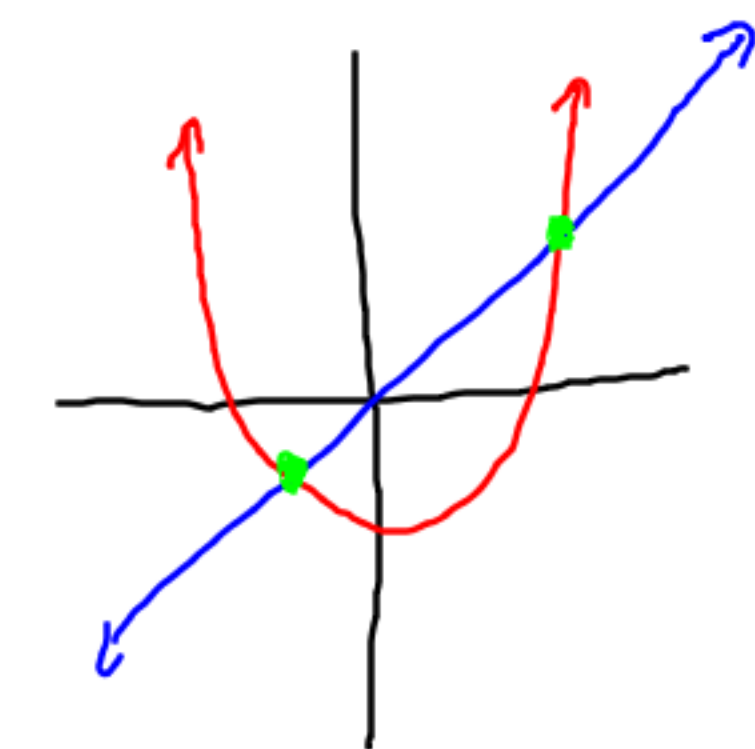
↳ all questions must be completed in class

↳ you may use all your notes + textbook + others.

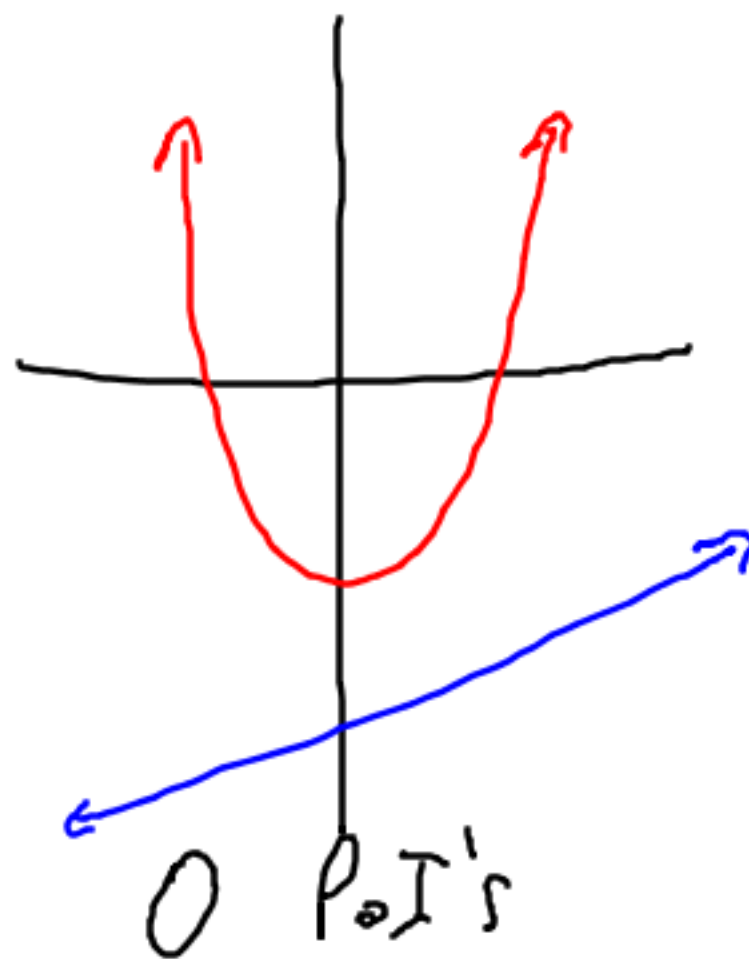
↳ your work must be your own, No copying!!

3.8 Linear - Quadratic Systems:

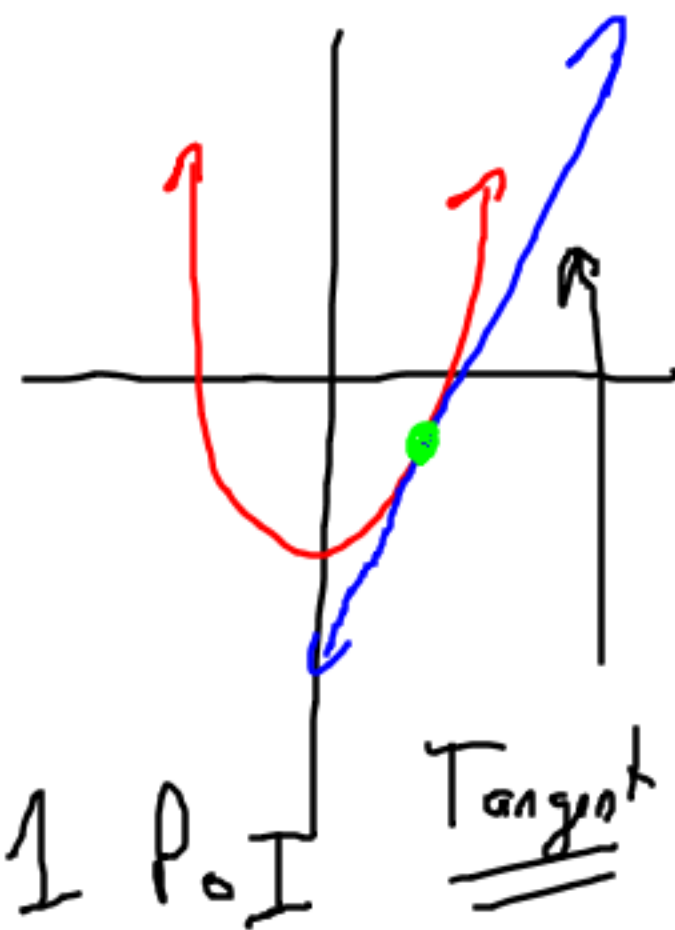
When a line and parabola meet. There are
3 possibilities:



Two P.O.I's



0 P.O.I's



1 P.O.I
Tangent

$$f(x) = 3x + 5 \quad g(x) = 2x^2 - 3x - 4$$

Find how many PoI's there are.

$$f(x) = g(x)$$
$$3x + 5 = 2x^2 - 3x - 4$$

$$0 = \underset{a}{2}x^2 - \underset{b}{6}x - \underset{c}{9}$$

$$\begin{aligned} b^2 - 4ac &= (-6)^2 - 4(2)(-9) \\ &= 36 + 72 \\ &= 108 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\therefore b^2 - 4ac > 0$$

$\therefore$ 2 PoI's

Find the POI's of $f(x)$ and $g(x)$.

$$2x^2 - 6x - 9 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{6 \pm \sqrt{108}}{2(2)}$$

$$x = \frac{6 \pm 10.4}{4}$$

$$x = \frac{6 + 10.4}{4} = 4.1$$

and

$$x = \frac{6 - 10.4}{4} = -1.1$$

finally, find the y 's. (use the linear f_n)

$$f(x) = 3x + 5$$

$$f(4.1) = 3(4.1) + 5$$

$$f(4.1) = 17.3$$

$$(4.1, 17.3)$$

$$f(-1.1) = 3(-1.1) + 5$$

$$f(-1.1) = 1.7$$

$$(-1.1, 1.7)$$

Let $f(x) = 2x + k$ $g(x) = 3x^2 + 5x - 2$

Find the value of k so that $f(x)$ and $g(x)$ intersect only once.

$$f(x) = g(x)$$

$$2x + k = 3x^2 + 5x - 2$$

$$0 = 3x^2 + 3x - 2 - k$$

$$0 = \underbrace{3x^2 + 3x - 2 - k}_c$$

a b c

$$b^2 - 4ac = 0$$

$$3^2 - 4(3)(-2 - k) = 0$$

$$9 - 12(-2 - k) = 0$$

$$9 + 24 + 12k = 0$$

$$12k = -33$$

$$k = \frac{-33}{12} = \frac{-11}{4} = -2.75$$