

Today's Learning Goal(s):

By the end of the class, I will be able to:

- find the point of intersection between a line and a parabola.
- solve problems involving the intersection of linear and quadratic functions .

Last day's work: Wkst 1-6 [7,8]

3.8 Linear-Quadratic Systems

Date: Oct. 21/15

Ex. 1: Consider the following linear-quadratic system.

$$y = (x - 3)^2 - 7$$

$$y = x - 6$$

$$b = -6$$

$$m = \frac{1}{1} \left(\frac{\text{rise}}{\text{run}} \right)$$

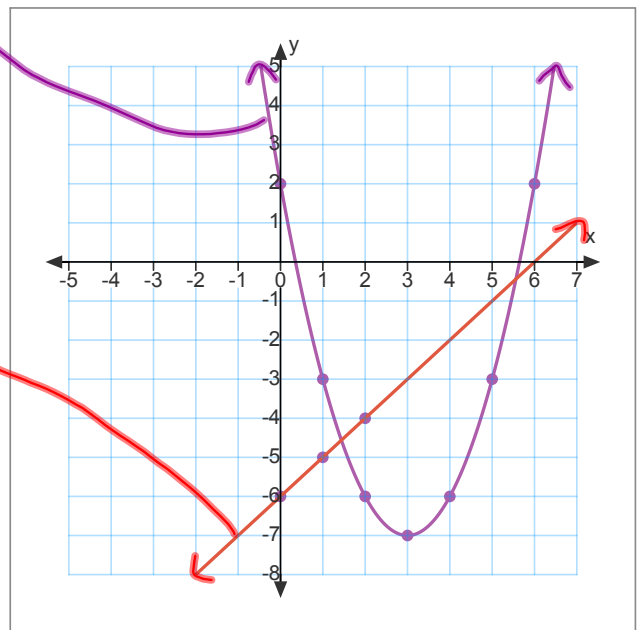
$$v(3; 7)$$

$$a = 1$$

- a) Solve the system by graphing.

∴ the solutions are approximately

$$(1.4, -4.6) \text{ and } (5.5, 0.5)$$



Ex. 1 (cont'd)

b) Solve the system algebraically.

$$y = (x-3)^2 - 7$$

$$y = x - 6$$

Use Substitution

$$x-6 = (x-3)^2 - 7$$

$$x-6 = x^2 - 6x + 9 - 7$$

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

$$0 = x^2 - 7x + 8$$

$$a=1 \quad b=-7 \quad c=8$$

$$x = \frac{7 + \sqrt{17}}{2}$$

$$x = \frac{7 - \sqrt{17}}{2}$$

Recall

$$y = x - 6$$

$$y = \left(\frac{7 + \sqrt{17}}{2}\right) - 6$$

$$y = \left(\frac{7 - \sqrt{17}}{2}\right) - 6$$

Sub in line.

$$= \frac{7 + \sqrt{17}}{2} - \frac{12}{2}$$

$$= \frac{7 - \sqrt{17}}{2} - \frac{12}{2}$$

$$= \frac{-5 + \sqrt{17}}{2}$$

$$= \frac{-5 - \sqrt{17}}{2}$$

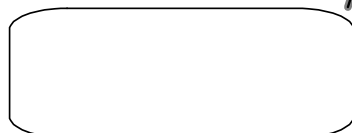
\therefore the solutions are $\left(\frac{7 + \sqrt{17}}{2}, \frac{-5 + \sqrt{17}}{2}\right)$ and $\left(\frac{7 - \sqrt{17}}{2}, \frac{-5 - \sqrt{17}}{2}\right)$

$$(5.56, -0.438)$$

$$(1.438, -4.561)$$

$$(5.5, -0.5)$$

$$(1.4, -4.6)$$



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

$$= \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(8)}}{2(1)}$$

$$= \frac{7 \pm \sqrt{49 - 32}}{2}$$

$$x = \frac{7 \pm \sqrt{17}}{2}$$

Ex. 2: For what values of m is $y = mx - 2$ tangent to the parabola defined by $y = -x^2 + 8x - 11$?

$$mx - 2 = -x^2 + 8x - 11$$

$$x^2 - 8x + 11 + mx - 2 = 0$$

$$x^2 - 8x + mx + 9 = 0$$

$$x^2 + x(-8+m) + 9 = 0$$

$$x^2 + (-8+m)x + 9 = 0$$

$$a=1 \quad b=-8+m \quad c=9$$

$$=m-8$$

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

$$(-8+m)^2 - 4(1)(9) = 0$$

$$64 - 16m + m^2 - 36 = 0$$

$$m^2 - 16m + 28 = 0$$

$$(m-14)(m-2) = 0$$

$$\therefore m=14 \text{ or } m=2$$

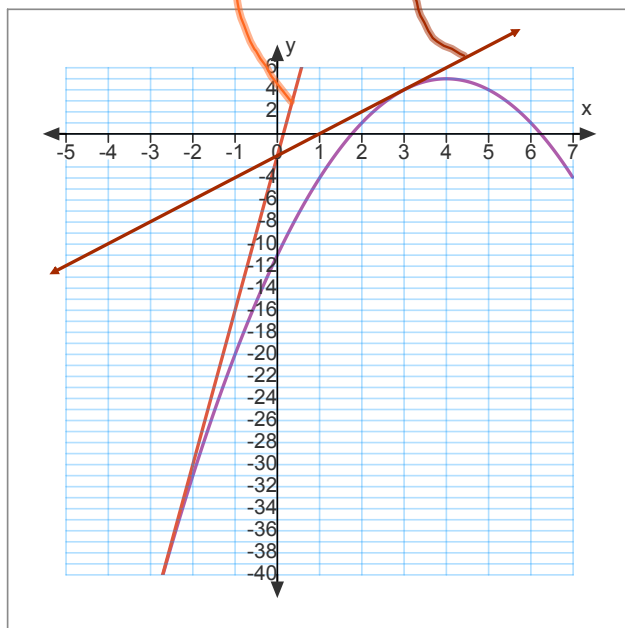
$\therefore y = 14x - 2$ or $y = 2x - 2$ are the equations of the tangents.

Ex. 2: (Graphical Check of our Solution)

$$y = -x^2 + 8x - 11$$

$$y = 2x - 2$$

$$y = 14x - 2$$



Are there any Homework Questions you would like to see on the board?

Last day's work: Wkst 1-6 [7,8]

2, 4, 5, 6

Today's Homework Practice includes:

pp. 198-199 #1c, 2ac, 3, 4ab, 5 - 8 [11]