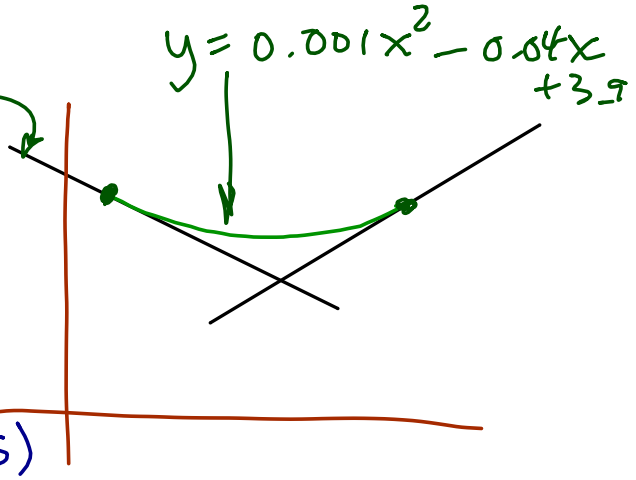
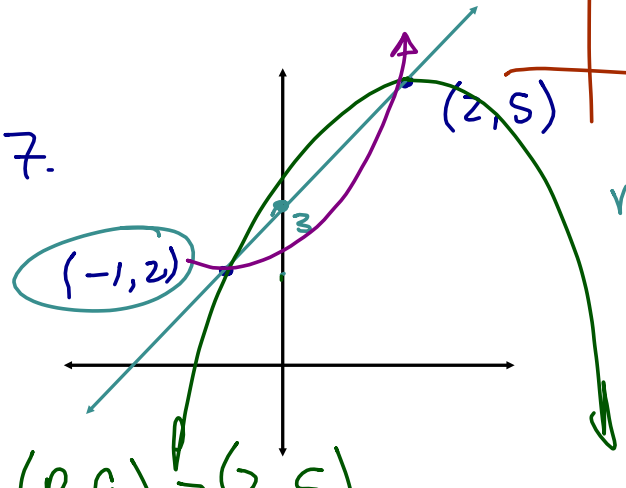
10, 17



10) $y = -0.04x + 3.9$

$y = 0.03x + 2.675$

17.



$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{5-2}{2-(-1)} = \frac{3}{3} = 1$

$y = (1)x + b$

$2 = (1)(-1) + b$

$3 = b$

① $y = x + 3$

$(p,q) = (2,5)$

$y = a(x-2)^2 + 5$

Sub in $(-1,2)$

$2 = a(-1-2)^2 + 5$

$2 = a(-3)^2 + 5$

$\frac{-3}{9} = \frac{9a}{9}$

$-\frac{1}{3} = a$

② $y = -\frac{1}{3}(x-2)^2 + 5$

$y = \frac{1}{3}(x+1)^2 + 2$

8.2 Solving Systems Algebraically

* Solving systems can generally be done by substitution or elimination.

ex. Solve by substitution $\begin{cases} 3x - y = 0 & ① \\ y = x^2 - 2x + 4 & ② \end{cases}$ sub ② into ①

① $3x - (x^2 - 2x + 4) = 0$

$3x - x^2 + 2x - 4 = 0$

$0 = x^2 - 5x + 4$

$0 = (x-4)(x-1)$

$x - 4 = 0$ $\quad x - 1 = 0$

$x = 4$ $\quad x = 1$

sub $x = 4$ into ①

$3(4) - y = 0$

$12 = y \Rightarrow (4, 12)$

sub $x = 1$ into ①

$3(1) - y = 0$

$3 = y \Rightarrow (1, 3)$

$\therefore$ 2 sols @ (4,12) and (1,3)

ex. Solve by elimination $\begin{cases} 5x - y = 10 & ① \\ x^2 + x - 2y = 0 & ② \end{cases}$

with quadratics it is unlikely that you can eliminate the x-terms → try to eliminate the y-terms

* we must align like terms

① $0x^2 + 5x - y = 10$

② $x^2 + x - 2y = 0$

$2 \times ① - ②$

$0x^2 + 10x - 2y = 20$

$\ominus \quad x^2 + x - 2y = 0$

$-x^2 + 9x + 0y = 20$

$0 = x^2 - 9x + 20$

$0 = (x-5)(x-4)$

$x = 5$ $\quad x = 4$

sub $x = 4$ into ①

$5(4) - y = 10$

$20 - y = 10$

$20 - 10 = y$

$10 = y \Rightarrow (4, 10)$

sub $x = 5$ into ①

$5(5) - y = 10$

$25 - 10 = y$

$15 = y \Rightarrow (5, 15)$

Your turn pg. 442 with both solutions

ex. Determine two integers such that the sum of the smaller number and twice the larger number is 46. Also, when the square of the smaller number is decreased by three times the larger, the result is 93.

let x = smaller #
y = larger #

① $x + 2y = 46$
② $x^2 - 3y = 93$

$3 \times ① \ominus 2 \times ②$

$0x^2 + 3x + 6y = 138$
$\ominus\ 2x^2 + 0x - 6y = 186$
$2x^2 + 3x = 324$
$2x^2 + 3x - 324 = 0$

use the Q.F... check Δ

$\Delta = b^2 - 4ac$
$= (3)^2 - 4(2)(-324)$
$= 2601 \Rightarrow$ real sol^{n}s

$x = \dfrac{-(3) \pm \sqrt{2601}}{2(2)} = \dfrac{-3 \pm 51}{4}$

$x = -\dfrac{27}{2}$ not an integer

$x = 12$

sub & solve ①

$(12) + 2y = 46$
$2y = 34$
$y = 17$

∴ smaller # = 12
larger # = 17

ex. Solve $\begin{cases} 3x^2 - x - y - 2 = 0 & ① \\ 6x^2 + 4x - y = 4 & ② \end{cases}$

$3x^2 - x - y = 2$
$\ominus\ 6x^2 + 4x - y = 4$
$-3x^2 - 5x = -2$
$0 = 3x^2 + 5x - 2$
$0 = (3x - 1)(x + 2)$

$3x - 1 = 0$ or $x + 2 = 0$
$3x = 1$ $x = -2$
$x = \frac{1}{3}$

sub $x = -2$ into ①

$3(-2)^2 - (-2) - y - 2 = 0$
$12 + 2 - 2 = y$
$12 = y \Rightarrow (2, 12)$

sub $x = \frac{1}{3}$ into ①

$3\left(\frac{1}{3}\right)^2 - \left(\frac{1}{3}\right) - y - 2 = 0$
$\frac{1}{3} - \frac{1}{3} - 2 = y$
$\left(\frac{1}{3}, -2\right)$

Homefun: Pg. 451 #1, 3ad, 4a, 5c, 6, 9, 10, 13, 19, 20, 23