

C11 - 8.0 - Q1 Systems Review Solutions

a) $y = x + 1$ $y = -2x + 1$ $(-4, -3)$

$-3 = (-4) + 1$ $-3 = -2(-4) + 1$

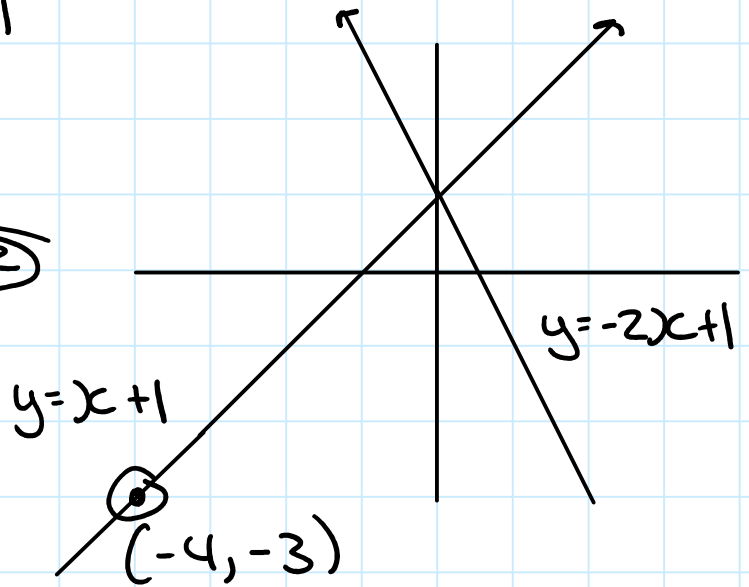
✓ $-3 = -3$

$-3 = 8 + 1$

$-3 \neq 9$ ✗

on line

not on line



b) $y - 3 = x$ $3x = -5 - y$ $(-2, 1)$

$1 - 3 = -2$ $3(-2) = -5 - 1$

$-2 = -2$ ✓

$-6 = -6$ ✓

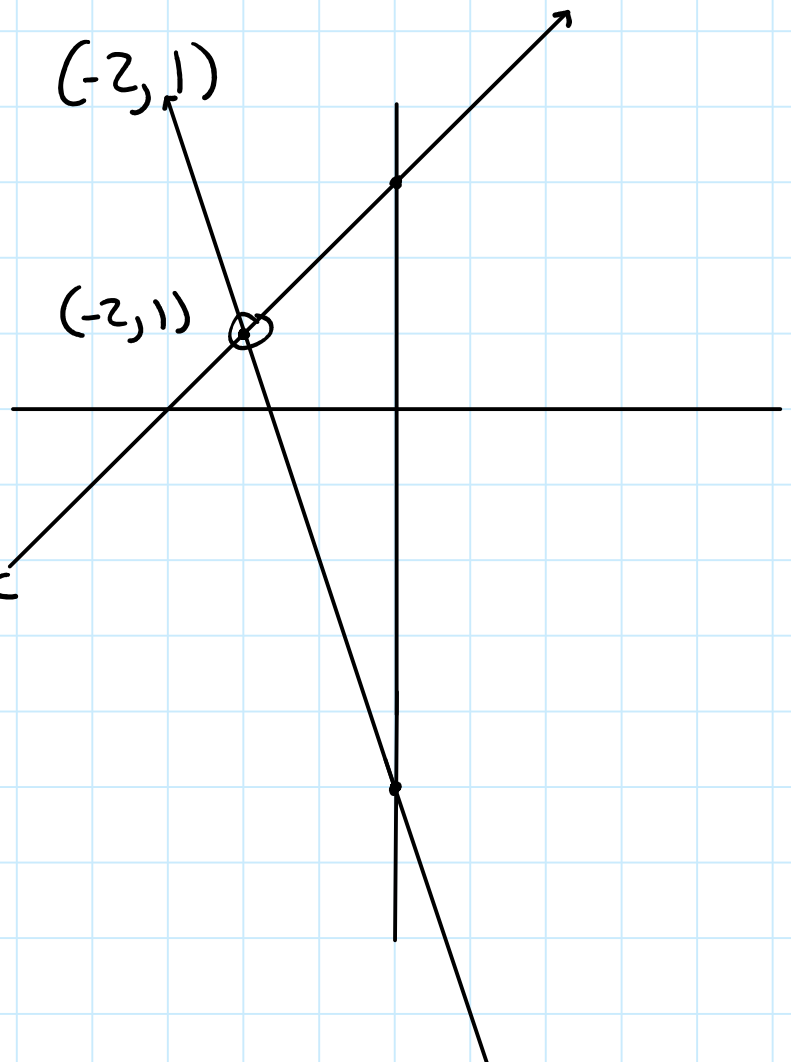
$y - 3 = x$
+3 +3

$3x = -5 - y$
+y +y

$y = x + 3$

$y + 3x = -5$
 $-3x \quad -3x$

$y = -3x - 5$

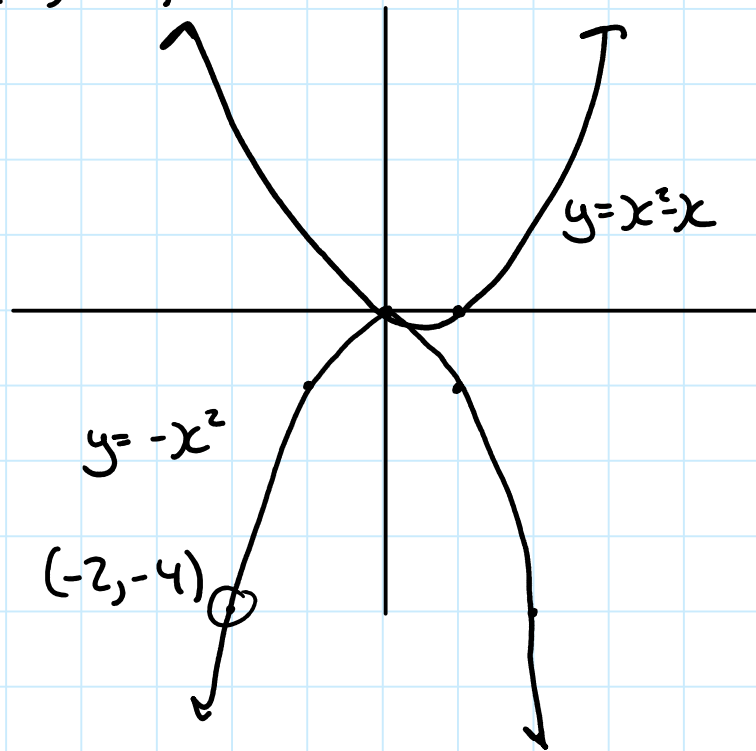


C11 - 8.0 - Q1 Systems Review Solutions

c) $y = -x^2$
 $-4 = -(-2)^2$
 $\checkmark -4 = -4$
on line

$y = x^2 - x$ $(-2, -4)$
 $-4 = (-2)^2 - (-2)$
 $-4 = 4 + 2$
 $-4 \neq 6 \times$
not on line

$y = x^2 - x$
 $0 = x(x-1)$
 $x = 0 \quad x = 1$

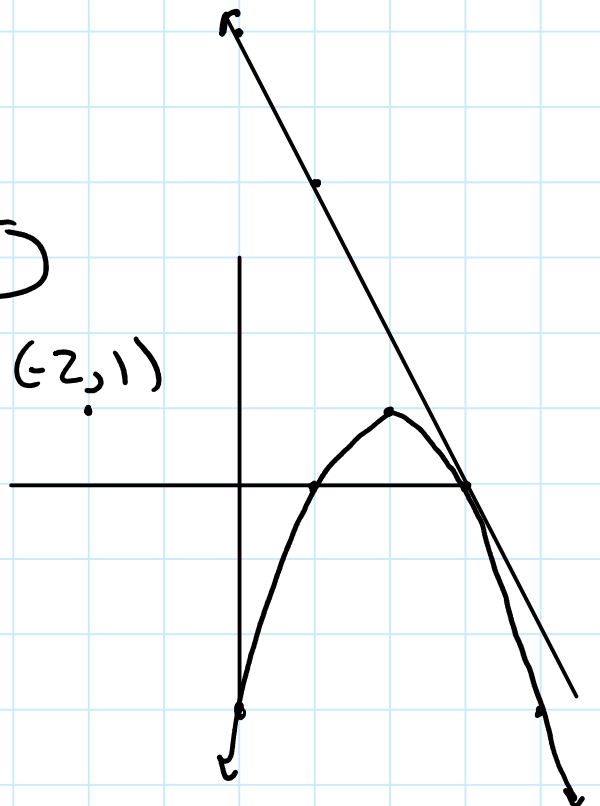


d) $y = -(x-2)^2 + 1$
 $1 = -(-2-2)^2 + 1$
 $1 = -16 + 1$
 $1 \neq -15 \times$

$y = 6 - 2x$ $(-2, 1)$
 $1 = 6 - 2(-2)$
 $1 = 6 + 4$
 $1 \neq 10 \times$

$(-2, 1)$ is not the intersection

$y = 6 - 2x$
 $y = -2x + 6$



C11 - 8.0 - Q1 Systems Review Solutions

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

$$3+5 = 2(7-5)^2$$

$$8 = 2(4)$$

$$8 = 8 \checkmark$$

$$y+x^2 = 10x-18$$

$$3+(7)^2 = 10(7)-18$$

$$3+49 = 70-18$$

$$52 = 52 \checkmark$$

(7,3)

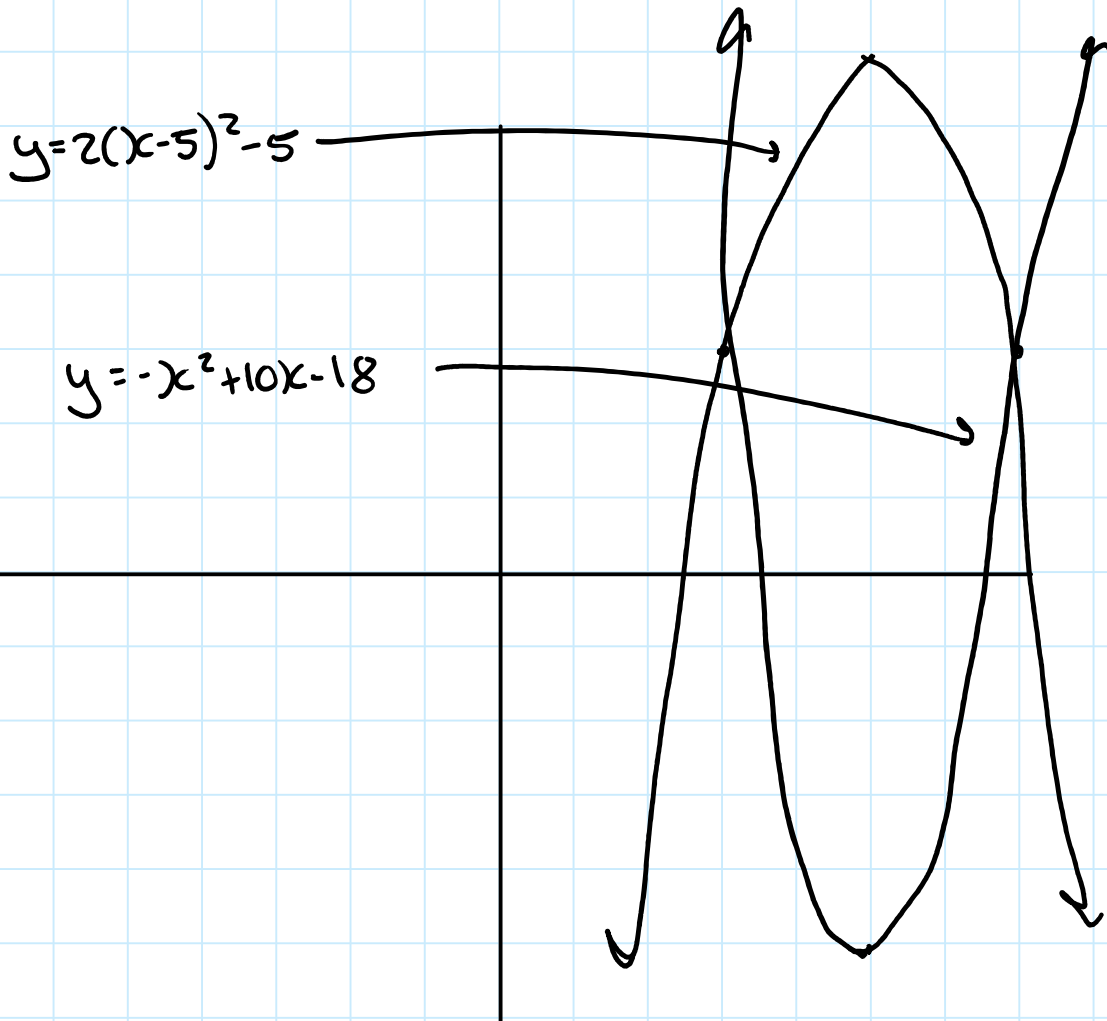
yes there is an intersection at (7,3)

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

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

$$y+x^2 = 10x-18$$

$$y = -x^2 + 10x - 18$$



C11 - 8.0 - Q2 Systems Review Solutions

2a) $(y)-1 = x$ $y = (x^2 - 1)$

$(x^2 - 1) - 1 = x$

$x^2 - 2 = x$

$x^2 - x - 2 = 0$

$(x-2)(x+1)$

$x=2$ $x=-1$

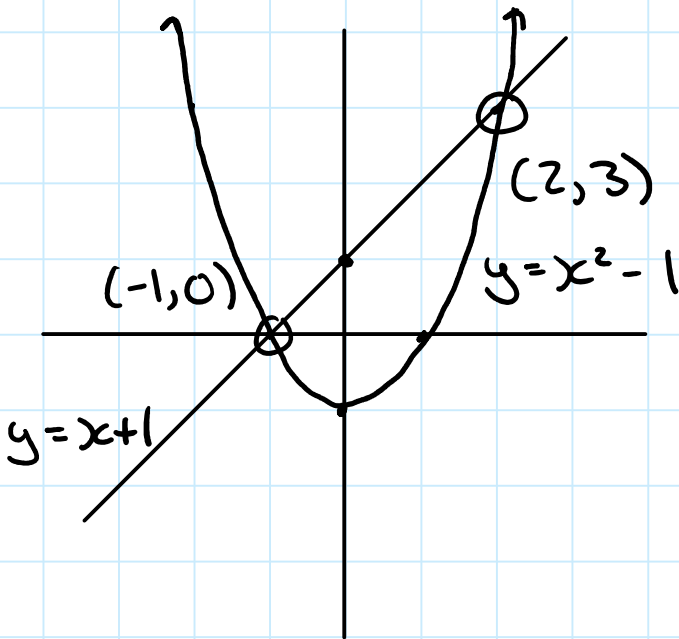
$y = (2^2 - 1)$

$y = 3$

$y = ((-1)^2 - 1)$

$y = 0$

points: $(2, 3), (-1, 0)$



$y - 1 = x$
 $y = x + 1$

$y = x^2 - 1$

OR

$y - 1 = x$

$y = x^2 - 1$

$y = x + 1$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

$x=2$ $x=-1$

$y = x^2 + 0 - 1$
 ~~$y = 0 + x + 1$~~
 $0 = x^2 - x - 2$

C11 - 8.0 - Q2 Systems Review Solutions

b) $0 = x - (y) + 4$ $y = (x^2 + 2)$

$0 = x - (x^2 + 2) + 4$

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

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

$(x+1)(x-2)$

$x = -1$ $x = 2$

$y = x^2 + 2$

$y = (-1)^2 + 2$

$y = 3$

$y = x^2 + 2$

$y = (2)^2 + 2$

$y = 6$

Points: $(-1, 3)$, $(2, 6)$

c) $y = (x^2)$

$(y)+1 = 2x$

$x^2 + 1 = 2x$

$y = x^2$

$y = (1)^2$

$y = 1$

$x^2 - 2x + 1 = 0$

$(x-1)(x-1)$

$x = 1$

$x^2 - 2x + 1$

$x^2 - 1x - 1x + 1$

$x(x-1) - 1(x-1)$

$(x-1)(x-1)$

Point: $(1, 1)$

d) $2x - (y) = 5$

$2x - (x^2 - 4) = 5$

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

$-x^2 + 2x - 1 = 0$

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

$-x+1 = 0$

$-x = -1$

$x = 1$

$y = (x^2 - 4)$

$-x^2 + 2x - 1$

$-x^2 + 1x + 1x - 1$

$y = x^2 - 4$

$y = (1)^2 - 4$

$y = 3$

$-x(x-1) + 1(x-1)$

$(-x+1)(x-1)$

Point: $(1, 3)$

e) $y+3 = x^2 - 2x$ x -axis y -axis
 $y=0$ $x=0$

$$y+3 = x^2 - 2x$$

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

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

$$(x-3)(x+1)$$

$$x=3 \quad x=-1$$

points: $(3,0), (3,-1), (0,-3)$

$$y+3 = x^2 - 2x$$

$$y+3 = 0^2 - 2(0)$$

$$y = -3$$

f) $y+1 = x^2$

$$y = (x^2 - 1)$$

$$y = (x^2 - 1)$$

$$y = (-2)^2 - 1$$

$$y = 3$$

$$y = (x^2 - 1)$$

$$y = (2)^2 - 1$$

$$y = 3$$

$$4(y) = -x^2 + 16$$

$$4(x^2 - 1) = -x^2 + 16$$

$$4x^2 - 4 = -x^2 + 16$$

$$5x^2 - 20 = 0$$

$$5(x^2 - 4) = 0$$

$$5(x+2)(x-2) = 0$$

$$x = -2 \quad x = 2$$

points: $(-2,3), (2,3)$

$$g) \begin{cases} y+3+2x = x^2 \\ y+1 = -2(x-1)^2 \\ y = (-2(x-1)^2 - 1) \end{cases}$$

$$-2(x-1)^2 - 1 + 3 + 2x = x^2$$

$$-2(x^2 - 2x + 1) - 1 + 3 + 2x - x^2 = 0$$

$$-2x^2 + 4x - 2 - 1 + 3 + 2x - x^2 = 0$$

$$-3x^2 + 6x = 0$$

$$-3x(x-2) = 0$$

$$x=0 \quad x=2$$

point: $(0, -3)(2, -3)$

$$y = -2(x-1)^2 - 1$$

$$y = -2(0-1)^2 - 1$$

$$y = -2(-1)^2 - 1$$

$$y = -2 - 1$$

$$y = -3$$

$$y = -2(x-1)^2 - 1$$

$$y = -2(2-1)^2 - 1$$

$$y = -2(1)^2 - 1$$

$$y = -3$$

$$h) \begin{cases} y = x^2 + 1 \\ y + x^2 - 1 = 0 \end{cases}$$

$$y = x^2 + 1$$

$$x^2 + 1 + x^2 - 1 = 0$$

$$y = 0^2 + 1$$

$$2x^2 = 0$$

$$y = 1$$

$$x = 0$$

point: $(0, 1)$

$$i) y = (-x^2 + 8x - 12) \quad (y = 2x^2 - 28x + 96)$$

$$y = -(6)^2 + 8(6) - 12$$

$$y = -36 + 48 - 12$$

$$y = 0$$

$$-x^2 + 8x - 12 = 2x^2 - 28x + 96$$

$$+x^2 - 8x + 12$$

$$3x^2 - 36x + 108 = 0$$

$$3(x^2 - 12x + 36)$$

$$(x - 6)(x - 6)$$

Point: (6, 0)

$$j) y = (x^2 + 2x - 1) \quad (y = 2x^2 + 8x + 10)$$

$$y = ((-3)^2 + 2(-3) - 1) \quad 2(x^2 + 2x - 1) = 2x^2 + 8x + 10$$

$$y = 9 - 6 - 1$$

$$y = 2$$

$$2x^2 + 4x - 2 = 2x^2 + 8x + 10$$

$$-2x^2 - 4x + 2$$

$$0 = 4x + 12$$

Point: (-3, 2)

$$4(x + 3) = 0$$

$$x = -3$$

C11 - 8.0 - Q3 Systems Review Solutions

$$K) \frac{y}{2} = \frac{x^2}{2} - \frac{3x}{2} - 2 \quad y = (-x^2 - 13)$$

$$\left(\frac{y}{2} = \frac{x^2}{2} - \frac{3x}{2} - 2 \right) 2$$

$$(y) = x^2 - 3x - 4$$

$$\begin{array}{r} (-x^2 - 13) = x^2 - 3x - 4 \\ +x^2 \quad +13 \end{array}$$

$$2x^2 - 3x + 9$$

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

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(9)}}{2(2)}$$

$$\frac{3 \pm \sqrt{-63}}{4}$$

no solution

3) let $h = \text{height}$ let $x = \text{distance}$

$$h = \left(\frac{1}{3}x\right) \quad (h = -\frac{1}{16}(x-8)^2 + 5)$$

$$\left(\frac{1}{3}x = -\frac{1}{16}(x-8)^2 + 5\right) 48$$

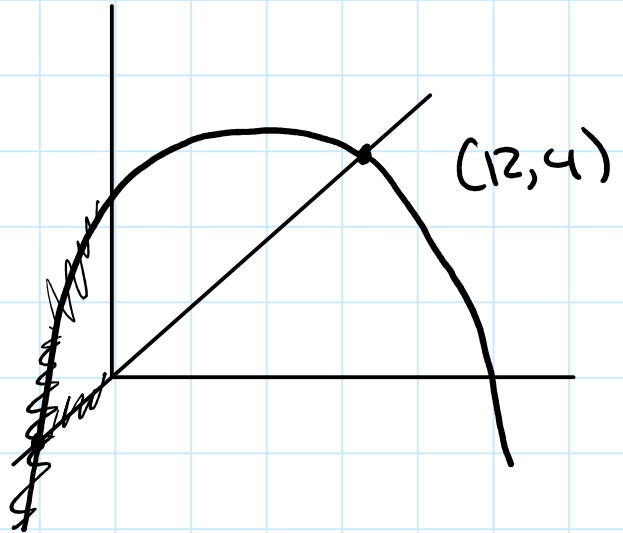
$$16x = -3(x-8)^2 + 240$$

$$16x = -3(x^2 - 16x + 64) + 240$$

$$16x = -3x^2 + 48x - 192 + 240$$

$$16x = -3x^2 + 48x + 48$$

$$+3x^2 - 48x - 48$$



$$3x^2 - 32x - 48 = 0$$

$$3x^2 - 36x + 4x - 48 = 0$$

$$3x(x-12) + 4(x-12) = 0$$

$$(3x+4)(x-12)$$

$$3x+4=0$$

$$3x = -4$$

$$x = -\frac{4}{3}$$

not realistic

$$x = 12$$

$$\frac{4}{4} x - \frac{36}{4} = -144$$

$$\frac{4}{4} + \frac{-36}{4} = -32$$

$$h = \left(\frac{1}{3}x\right)$$

$$h = \frac{1}{3}(12)$$

$$h = 4$$

intersection (12, 4)

4) let $h = \text{height}$ let $d = \text{distance}$

$$h = -2d^2 + 8d + 10$$

a) $h = 16\text{m}$ $d = ?$

$$16 = -2d^2 + 8d + 10$$

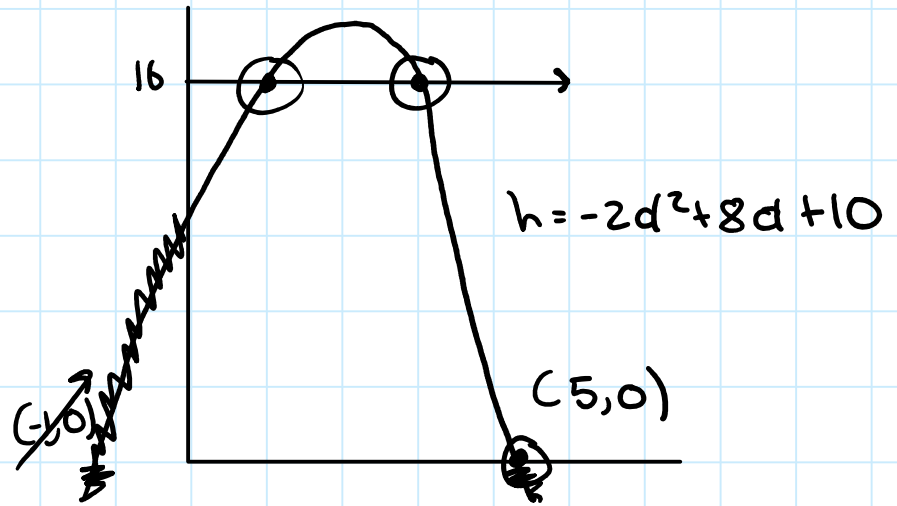
-16

$$0 = -2d^2 + 8d - 6$$

$$0 = -2(d^2 - 4d + 3)$$

$$0 = -2(d-3)(d-1)$$

$$d = 3 \quad d = 1$$



b) $h = 0$

$$h = -2d^2 + 8d + 10$$

$$0 = -2(d^2 - 4d - 5)$$

$$0 = -2(d-5)(d+1)$$

$$d = 5 \quad d = -1 \text{ not realistic}$$

C11 - 8.0 - Q5 Systems Review Solutions

let $y = \text{height}$ let $t = \text{time}$

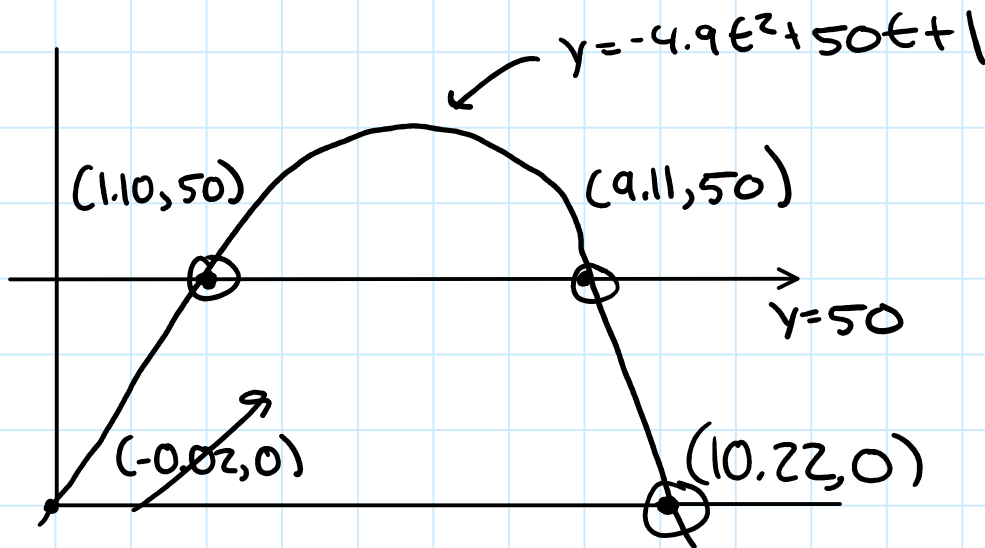
$Y =$ → $y_1 = -4.9t^2 + 50t + 1$ → $y_2 = 50$

$\boxed{\text{Window}}$ → $\boxed{Y_{\text{max}} = 150}$

$\boxed{2\text{nd}}$ → $\boxed{\text{Calc}}$ → $\boxed{5}$

When $\text{height}(y) = 50$ $\text{time}(t) = (1.10), (9.11)$

points: $(1.10, 50), (9.11, 50)$



$\boxed{2\text{nd}}$ → $\boxed{\text{Calc}}$ → $\boxed{\text{Zero}}$ → left bound, right bound

OR

$\boxed{Y_2 = 0}$ → $\boxed{2\text{nd}}$ → $\boxed{\text{Calc}}$ → $\boxed{\text{Inf}}$

6) let R = revenue let C = cost let P = profit

$$R = -x^2 + 200x \quad C = 10x + 1800$$

$$P = R - C$$

break even; $P = 0$

$$0 = R - C$$

$$R = C$$

$$-x^2 + 200x = 10x + 1800$$

$+x^2$ $-200x$

$$0 = x^2 - 190x + 1800$$

$$(x - 10)(x - 180)$$

$$x = 10 \quad x = 180$$

