p639 10.5

① $y = x^2 - 4x + 3$

Since $a > 0$ opens upward

② $y = x^2 - 6x + 5$

$a > 0$, so opens upward

③ $y = -2x^2 + x + 6$

Since $a < 0$ opens downward

④ $y = -2x^2 - 4x + 6$

Since $a < 0$ opens downward

⑤ $y = x^2 - 4x + 3$

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

$0 = (x-3)(x-1)$

$0 = x-3$ and $0 = x-1$

$x = 3$ and $x = 1$

⑥ $y = x^2 - 6x + 5$

$x^2 - 6x + 5 = 0$

$(x-5)(x-1) = 0$

$x-5 = 0$ and $x-1 = 0$

$x = 5$ and $x = 1$

⑦ $y = -x^2 + 8x - 12$

$-1(-x^2 + 8x - 12 = 0)$

$x^2 - 8x + 12 = 0$

$(x-6)(x-2) = 0$

$x-6 = 0$ and $x-2 = 0$

$x = 6$ and $x = 2$

⑧ $y = -x^2 - 2x + 3$

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

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

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

$x-1 = 0$ and $x+3 = 0$

$x = 1$ and $x = -3$

⑨ $y = x^2 + 2x - 4$

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

$a = 1$, $b = 2$, $c = -4$

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

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

$= \frac{-2 \pm \sqrt{4 + 16}}{2}$

$= \frac{-2 \pm \sqrt{4.5}}{2}$

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

$\frac{-2 - 2\sqrt{5}}{2} \approx -3.2$

and

$\frac{-2 + 2\sqrt{5}}{2} \approx 1.2$

p639 10.5

(10) $y = x^2 + 8x + 14$

$x^2 + 8x + 14 = 0$

$a=1$ $b=8$ $c=14$

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

$x = \frac{-8 \pm \sqrt{8^2-4(1)(14)}}{2(1)}$

$= \frac{-8 \pm \sqrt{64-56}}{2}$

$= \frac{-8 \pm \sqrt{24}}{2}$

$= \frac{-8 \pm 2\sqrt{2}}{2}$

$= \frac{-8-2\sqrt{2}}{2}$ and $\frac{-8+2\sqrt{2}}{2}$

$= -4-\sqrt{2}$ and $-4+\sqrt{2}$

≈ -5.4 and -2.6

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

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

$y = \boxed{3}$

(12) $y = x^2 - 6x + 5$

$y = 0^2 - 6(0) + 5$

$y = \boxed{5}$

(13) $y = -x^2 + 8x - 12$

$y = -0^2 + 8(0) - 12$

$y = \boxed{-12}$

(14) $y = -x^2 - 2x + 3$

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

$y = \boxed{3}$

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

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

$y = \boxed{-4}$

(16) $y = x^2 + 8x + 14$

$y = 0^2 + 8(0) + 14$

$y = \boxed{14}$

(18) $y = x^2 + 8x$

$y = 0^2 + 8(0)$

$y = \boxed{0}$

p639 10.5

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

$x_v = \frac{-b}{2a}$

$= \frac{-(-4)}{2(1)}$

$= \frac{4}{2}$

$x_v = 2$

$y_v = (2)^2 - 4(2) + 3$

$= 4 - 8 + 3$

$= -1$

$y_v = -1$

$(2, -1)$

(x_v, y_v)

(20) $y = x^2 - 6x + 5$

$x_v = \frac{-b}{2a}$

$= \frac{-(-6)}{2(1)}$

$= \frac{6}{2}$

$x_v = 3$

$y_v = 3^2 - 6(3) + 5$

$= 9 - 18 + 5$

$= -4$

$y_v = -4$

$(3, -4)$

(x_v, y_v)

(21) $y = 2x^2 + 4x - 6$

$x_v = \frac{-b}{2a}$

$= \frac{-4}{2(2)}$

$x_v = -1$

$y_v = 2(-1)^2 + 4(-1) - 6$

$= 2 - 4 - 6$

$y_v = -8$

(x_v, y_v)

$(-1, -8)$

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

$x_v = \frac{-b}{2a}$

$= \frac{-(-4)}{2(-2)}$

$= 0$

$x_v = -1$

$y_v = -2(-1)^2 - 4(-1) - 2$

$= -2 + 4 - 2$

$y_v = 0$

(x_v, y_v)

$(-1, 0)$

p654 10.5

(23) $y = x^2 + 6x$

$x_v = \frac{-b}{2a}$ $y_v = (-3)^2 + 6(-3)$

$= \frac{-6}{2(1)}$ $= 9 - 18$

$= -3$ $= -9$

$x_v = -3$ $y_v = -9$

(x_v, y_v)

$\boxed{(-3, -9)}$

(24) $y = x^2 + 8x$

$x_v = \frac{-b}{2a}$ $y_v = (-4)^2 + 8(-4)$

$= \frac{-8}{2(1)}$ $= 16 - 32$

$= -4$ $y_v = -16$

$x_v = -4$

(x_v, y_v)

$\boxed{(-4, -16)}$

(25) $y = x^2 + 8x + 7$

x-int

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

$(x+1)(x+7) = 0$

$x+1 = 0$ and $x+7 = 0$

$\boxed{x = -1 \text{ and } x = -7}$

y-int

$y = 0^2 + 8(0) + 7$

$\boxed{y = 7}$

Vertex

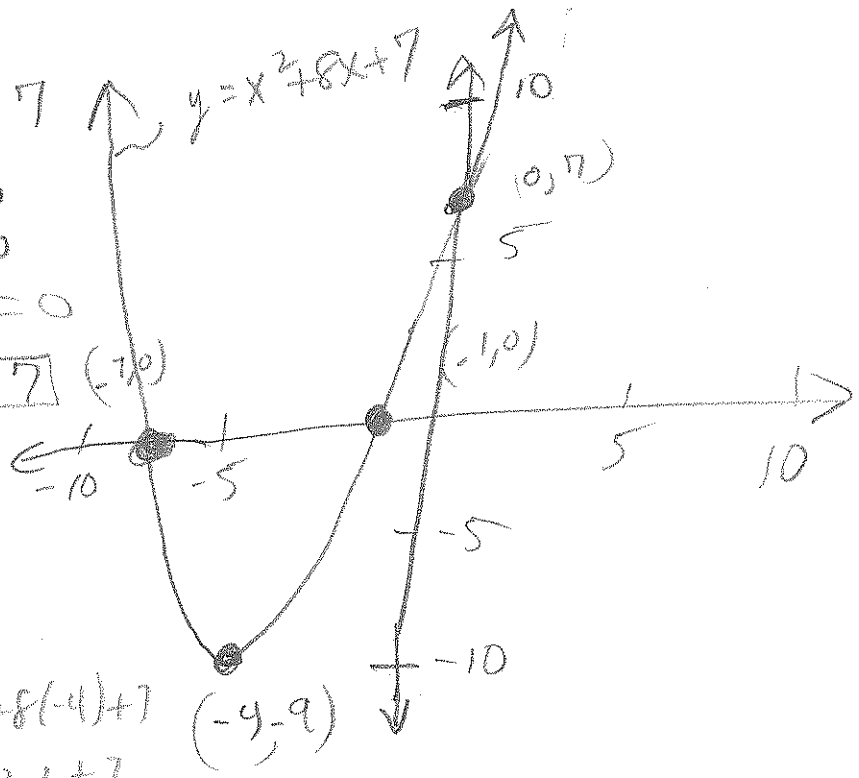
$x_v = \frac{-b}{2a}$ $y_v = (-4)^2 + 8(-4) + 7$

$= \frac{-8}{2(1)}$ $= 16 - 32 + 7$

$= -4$ $= -9$

$\boxed{(-4, -9)}$

(x_v, y_v)



10.5 p637

(26) $y = x^2 + 10x + 9$

x-int

$x^2 + 10x + 9 = 0$

$(x+1)(x+9) = 0$

$x+1=0$ and $x+9=0$

$x = -1$ and $x = -9$

y-int

$y = x^2 + 10x + 9$

$= 0^2 + 10(0) + 9$

$y = 9$

vertex

$x_v = \frac{-b}{2a} = \frac{-10}{2(1)}$

$x_v = -5$

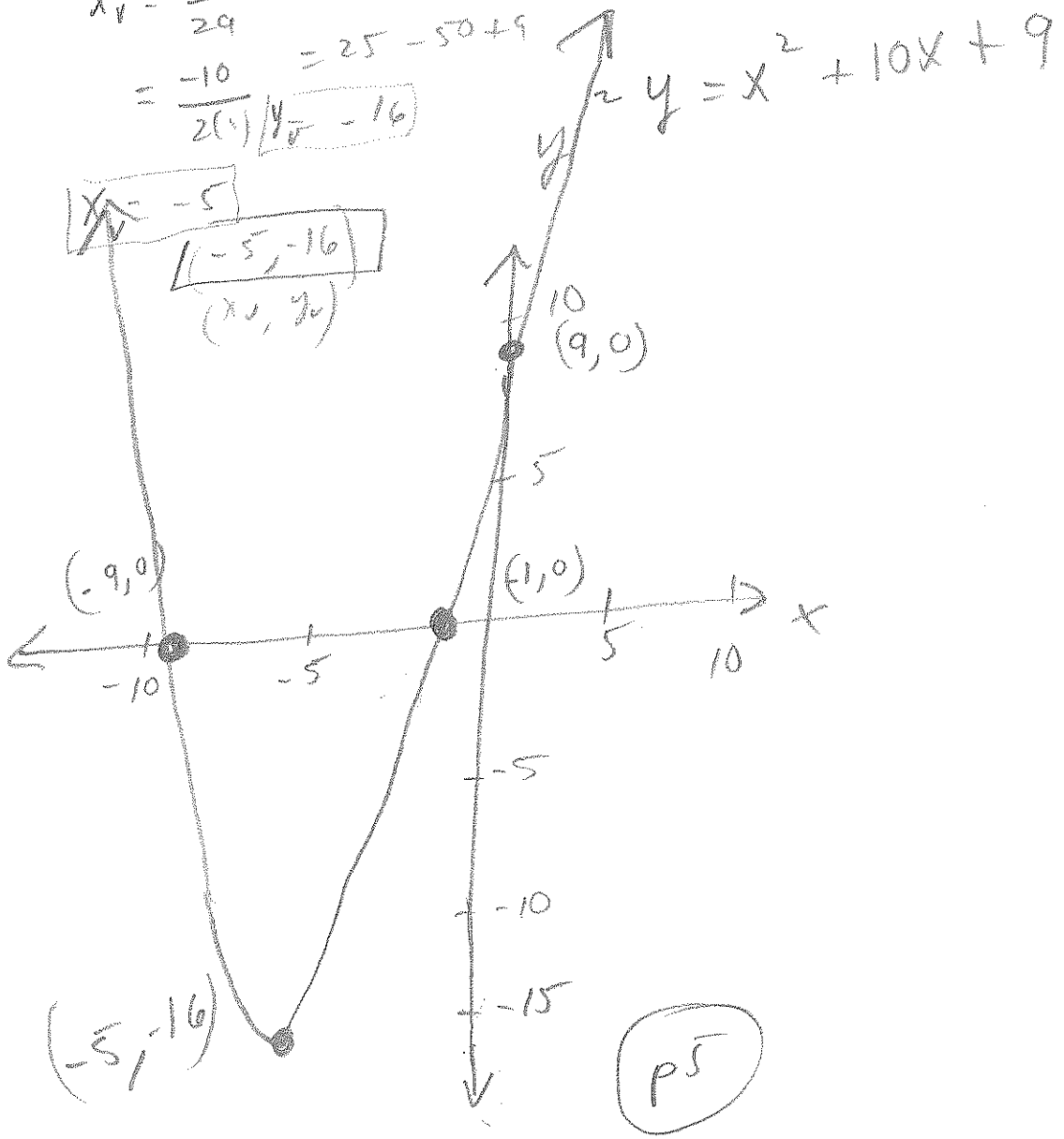
$y_v = (-5)^2 + 10(-5) + 9$

$= 25 - 50 + 9$

$y_v = -16$

$(-5, -16)$

(x_v, y_v)



p5

10.5 p 634

(27) $y = x^2 - 2x - 8$

x-int

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

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

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

$x = 4$ and $x = -2$

$\boxed{(4,0) \text{ and } (-2,0)}$

y-int

$y = 0^2 - 2(0) - 8$

y-int $= -8$

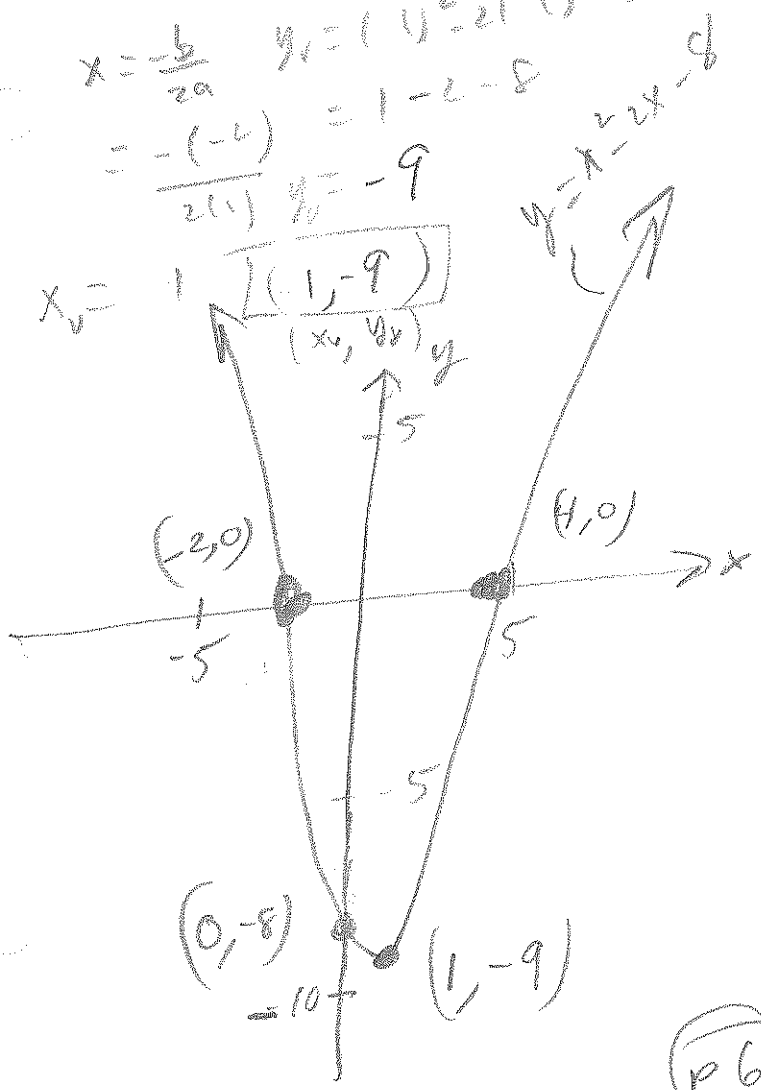
$\boxed{(0,-8)}$

Vertex

$x = \frac{-b}{2a} = \frac{-(-2)}{2(1)} = 1$

$y = (1)^2 - 2(1) - 8 = 1 - 2 - 8 = -9$

$\boxed{(1,-9)}$ (x_v, y_v)



(28) $y = x^2 + 4x - 5$

x-int

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

$(x-1)(x+5) = 0$

$x - 1 = 0$ and $x + 5 = 0$

$x = 1$ and $x = -5$

$\boxed{(1,0) \text{ and } (-5,0)}$

y-int

$y = 0^2 + 4(0) - 5$

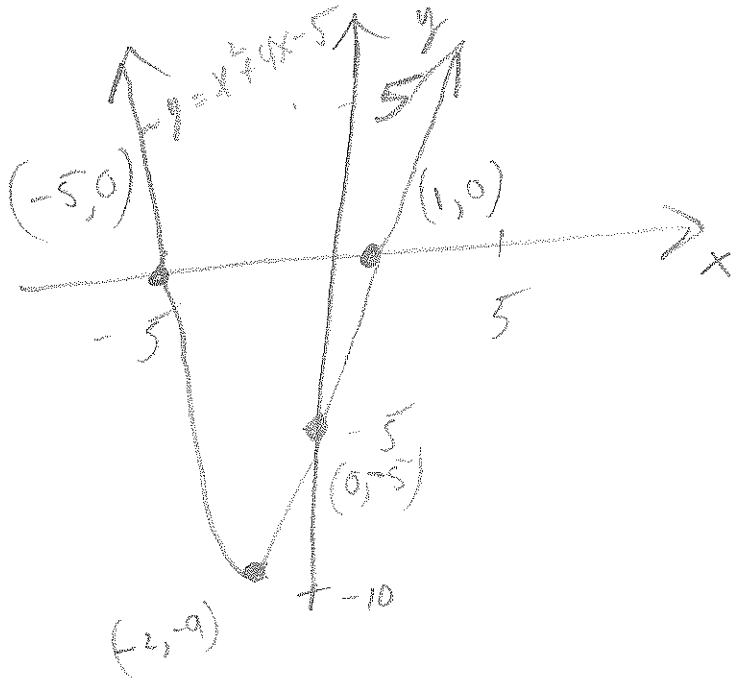
$y = -5$ $\boxed{(0,-5)}$

Vertex

$x = \frac{-b}{2a} = \frac{-4}{2(1)} = -2$

$y = (-2)^2 + 4(-2) - 5 = 4 - 8 - 5 = -9$

$\boxed{(-2,-9)}$ (x_v, y_v)



10.3 p639

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

x-int

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

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

$(x-1)(x-3) = 0$

$x - 1 = 0$ and $x - 3 = 0$

$x = 1$ & $x = 3$

$\boxed{(1,0), (3,0)}$

y-int

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

$y_{int} = -3$ $\boxed{(0,-3)}$

Vertex

$x = \frac{-b}{2a}$ $y_v = -(2)^2 + 4(2) - 3 = 0$

$= \frac{-(4)}{2(-1)}$ $= -4 + 8 - 3$

$= 2$ $= 1$

$x_v = 2$ (x_v, y_v)

$\boxed{(2,1)}$

(30) $y = -x^2 + 2x + 3$

x-int

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

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

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

$x - 3 = 0$ and $x + 1 = 0$

$x = 3$ and $x = -1$

$\boxed{(-1,0) + (3,0)}$

y-int

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

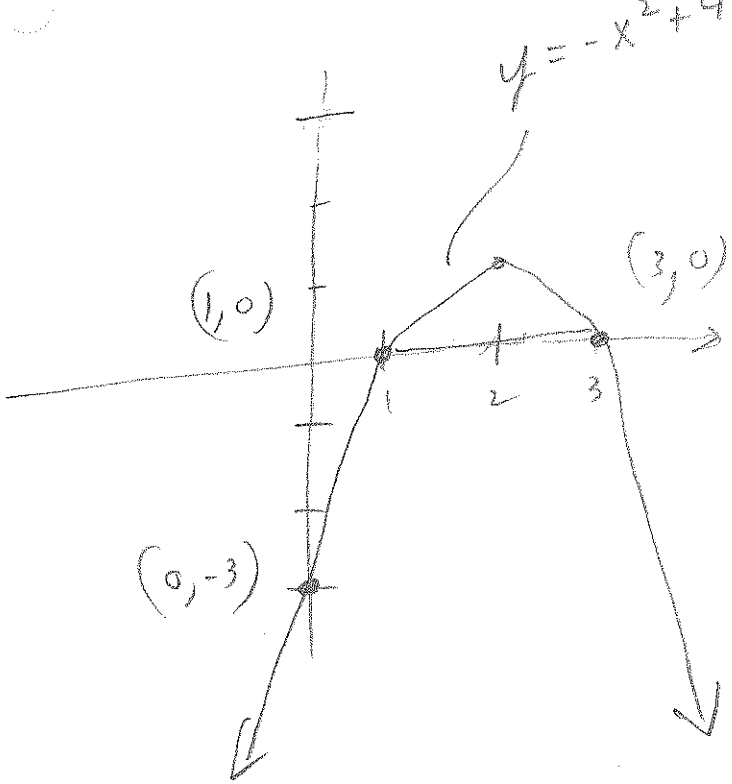
$\boxed{y_{int} = 3}$

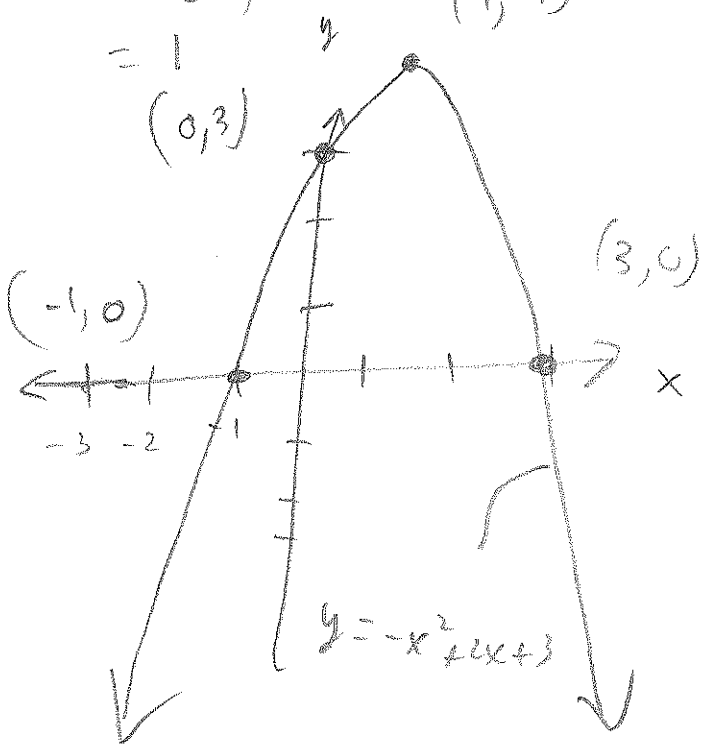
Vertex

$x_v = \frac{-b}{2a}$ $y_v = -(1)^2 + 2(1) + 3$

$= \frac{-2}{2(-1)}$ $= 4$

$= 1$ $(1,4)$





p634 10:5

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

x int

$x^2 - 1 = 0$

$x^2 = 1$

$x = \pm\sqrt{1}$

$x = -1$ and $x = 1$

y int

$y_{int} = 0^2 - 1$

$y_{int} = -1$

vertex

$x_v = \frac{-b}{2a}$ $\quad y_v = 0^2 - 1$

$= \frac{-0}{2(1)}$ $\quad y_v = -1$

$x_v = 0$

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

x int

$x^2 - 4 = 0$

$x^2 = 4$

$x = \pm\sqrt{4}$

$x = -2$ and $x = 2$

y int

$y = 0^2 - 4$

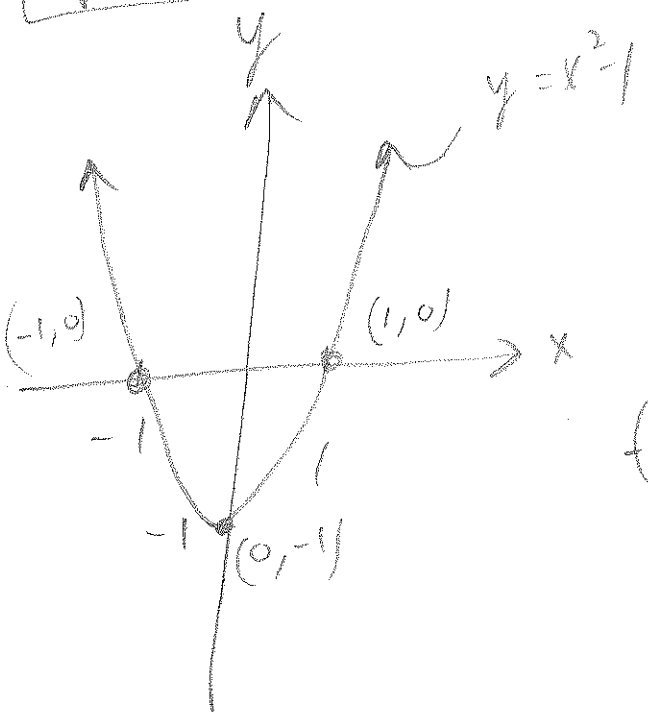
$y = -4$

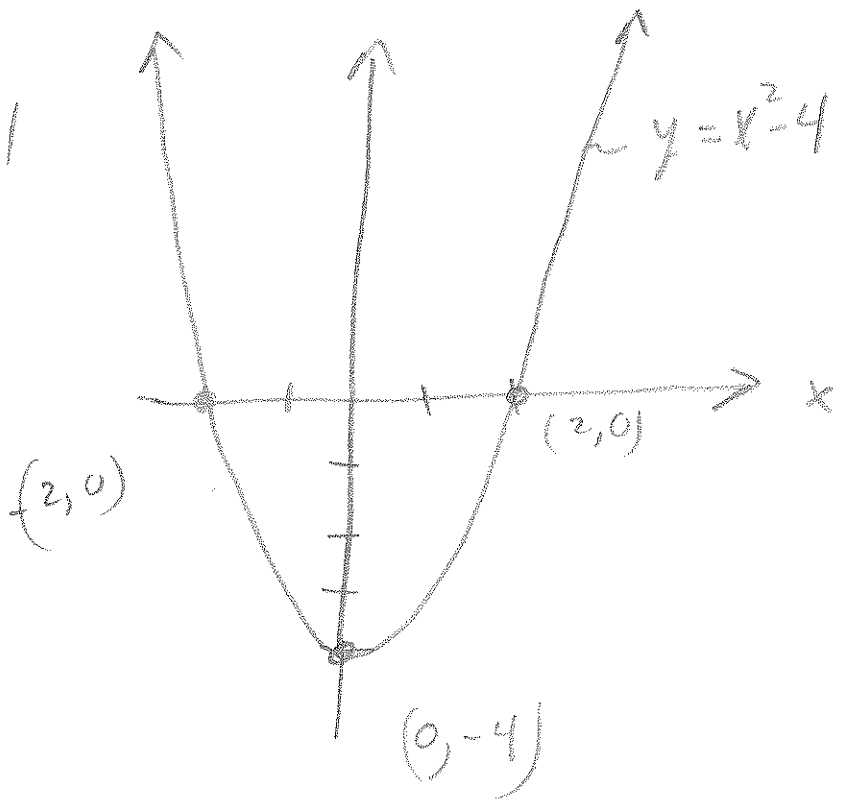
vertex

$x_v = \frac{-b}{2a}$ $\quad y_v = 0^2 - 4$

$= \frac{0}{2(1)}$ $\quad y_v = -4$

$x_v = 0$





p639 10.5

(33) $y = x^2 + 2x + 1$

x-int

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

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

$x + 1 = 0$

$\boxed{x = -1}$

y-int

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

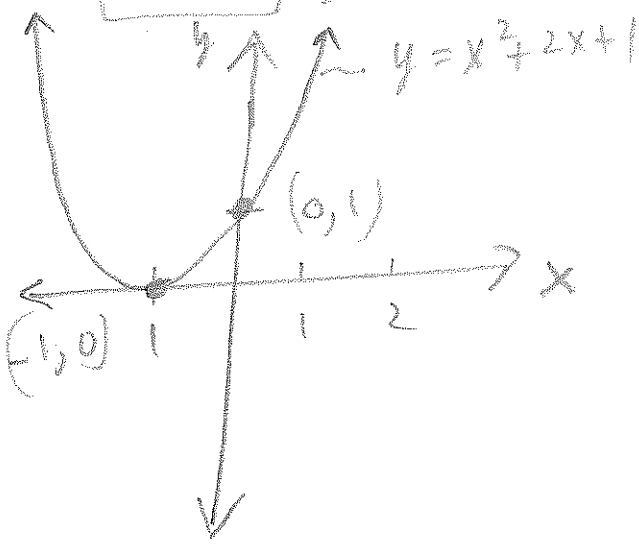
$\boxed{y_{int} = 1}$

Vertex

$x_v = \frac{-b}{2a}$ $y_v = (-1)^2 + 2(-1) + 1$

$x_v = \frac{-2}{2(1)}$ $= 1 - 2 + 1$

$\boxed{x_v = -1}$ $\boxed{y_v = 0}$



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

x-int

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

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

$x - 1 = 0$

$\boxed{x = 1}$

y-int

$y_{int} = 0^2 - 2(0) + 1$

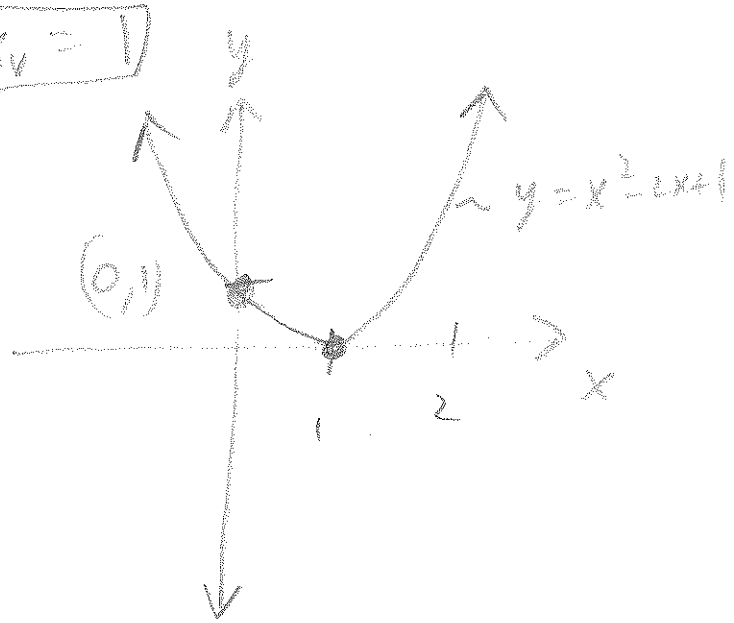
$\boxed{y_{int} = 1}$

Vertex

$x_v = \frac{-b}{2a}$ $y_v = (1)^2 - 2(1) + 1$

$= \frac{-(-2)}{2(1)}$ $= 1 - 2 + 1$

$\boxed{x_v = 1}$ $\boxed{y_v = 0}$



p639 10.5

(35) $y = -2x^2 + 4x + 5$

x-int

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

$a = -2$, $b = 4$, $c = 5$

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

$= \frac{-4 \pm \sqrt{4^2 - 4(-2)(5)}}{2(-2)}$

$= \frac{-4 \pm \sqrt{16 + 40}}{-4}$

$= \frac{-4 \pm \sqrt{56}}{-4}$

$= \frac{-4 \pm \sqrt{4 \cdot 14}}{-4}$

$= \frac{-4 \pm 2\sqrt{14}}{-4}$

$= \frac{-4}{-4} \pm \frac{2\sqrt{14}}{-4}$

$= 1 \pm \frac{\sqrt{14}}{2}$

$x_{int} = 1 - \frac{\sqrt{14}}{2}$ and $1 + \frac{\sqrt{14}}{2}$

$\approx -.87083$ and ≈ 2.87083

y-int

$y = -2(0)^2 + 4(0) + 5$

$y_{int} = 5$

vertex

$x_v = \frac{-b}{2a}$

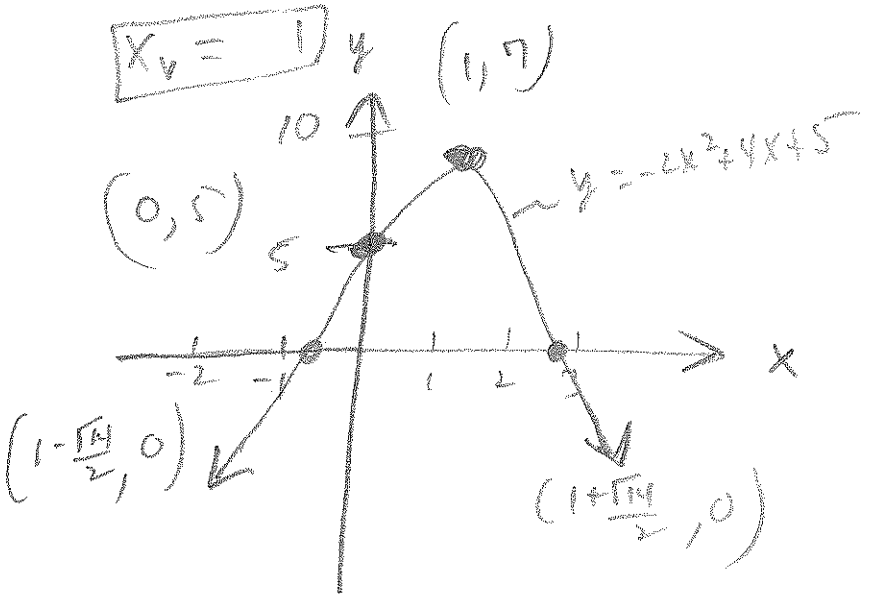
$= \frac{-4}{2(-2)}$

$x_v = 1$

$y_v = -2(1)^2 + 4(1) + 5$

$= -2 + 4 + 5$

$y_v = 7$



(30) $y = -3x^2 + 6x - 2$

$a = -3$

$b = 6$

$c = -2$

x-int

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

$$= \frac{-6 \pm \sqrt{6^2 - 4(-3)(-2)}}{2(-3)}$$

$$= \frac{-6 \pm \sqrt{36 - 24}}{-6}$$

$$= \frac{-6 \pm \sqrt{12}}{-6}$$

$$= \frac{-6 \pm 2\sqrt{3}}{-6}$$

$$= \frac{-6}{-6} \pm \frac{2\sqrt{3}}{-6}$$

$$= 1 \pm \frac{\sqrt{3}}{3}$$

$x = 1 - \frac{\sqrt{3}}{3}$ and $x = 1 + \frac{\sqrt{3}}{3}$

$x \approx 0.4226$ and $x \approx 1.5774$

vertex

$$x_v = \frac{-b}{2a}$$

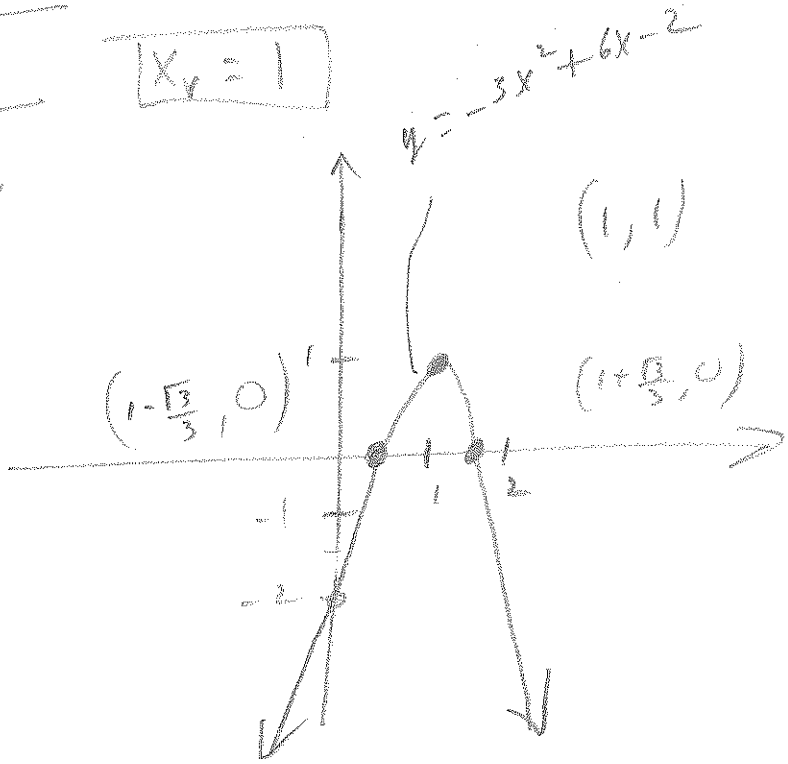
$$= \frac{-6}{2(-3)}$$

$x_v = 1$

$y_v = -3(1)^2 + 6(1) - 2$

$= -3 + 6 - 2$

$y_v = 1$



p657 10.5

(37) $y = (x-3)^2 + 2$

$y = (x-3)(x-3) + 2$

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

$y = x^2 - 6x + 11$

Vertex

$x_v = \frac{-b}{2a}$

$= \frac{-(-6)}{2}$

$x_v = 3$

$y_v = (3-3)^2 + 2$

$= 0 + 2$

$y_v = 2$

$x_v = 3$

(x_v, y_v)

$(3, 2)$

(47) $y = -0.01x^2 + 0.7x + 6.1$

x is horizontal distance in feet.

y is height in feet

(a) Maximum Height is y_v

$x_v = \frac{-b}{2a}$

$= \frac{-(0.7)}{2(-0.01)}$

$x_v = 35$ feet

$y_v = -0.01(35)^2 + 0.7(35) + 6.1$

$y_v = 18.35$ feet

(b) Max Horizontal Distance is when Height is 0.

$-0.01x^2 + 0.7x + 6.1 = 0$

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

$= \frac{-0.7 \pm \sqrt{(0.7)^2 - 4(-0.01)(6.1)}}{2(-0.01)}$

$= \frac{-0.7 \pm \sqrt{0.8567}}{2(-0.01)}$

$= \frac{-0.7 \pm \sqrt{0.8567}}{-0.02}$

$t = 77.84$ ft

(c) The shot was released when $x = 0$

$y = -0.01(0)^2 + 0.7(0) + 6.1$

$= 6.1$ ft