1.4 Homework (Quizzes due Tomorrow) 1.1, 1.2

Quadratic Equations (Eqns)

$f(x) = ax^2 + bx + c$

Vertex point (x_v, y_v) (h, v_y)

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

$y_v = f(-\frac{b}{2a})$

vertex point: $(-\frac{b}{2a}, f(-\frac{b}{2a}))$

Axis of Symmetry (line)

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

Max & Min point (maximum)

if $a > 0 \Rightarrow$ Min. point

$a < 0 \Rightarrow$ Max. point

Domain: $\mathbb{R}$ (all real numbers)

Range $\begin{cases} a>0 & [V_y, \infty) \\ a<0 & (-\infty, V_y] \end{cases}$

$$x = \frac{4 \pm \sqrt{16 - 4(-2)}}{2}$$

$$= \frac{4 \pm 2\sqrt{6}}{2}$$

$$= 2 \pm \sqrt{6}$$

Example

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

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

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

$= 4 - 8 - 2$

$= -6$

Vertex point: $(2, -6)$

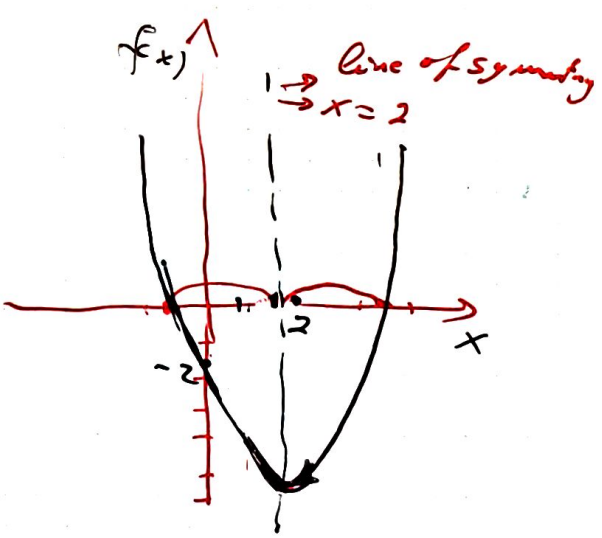
b) line of Symmetry: $x = 2$

c) Minimum point

Min. point @ $(2, -6)$

Domain: $\mathbb{R}$.

Range: $[-6, \infty)$



$f(x) = -x^2 - 2x + 8$

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

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

Vertex point $= (-1, 9)$

b) line of symmetry: $x = -1$

c) Max. point @ $(-1, 9)$

d) $x = -4, 2$

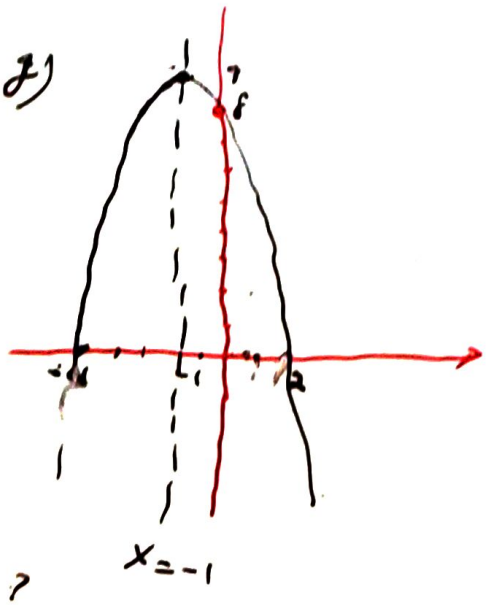
$x = \frac{2 \pm \sqrt{4+32}}{-2} = \frac{2 \pm 6}{-2}$? $\frac{2-6}{-2}$? $\frac{2+6}{-2}$?

e) $y = 8$ $(0, 8)$

f) Range: $(-\infty, 9]$ Domain: $\mathbb{R}$

h) Inc: $(-\infty, -1)$ Dec: $(-1, \infty)$

g)



#2 $f(x) = x^2 + 6x + 5 = 0$

a) $x = -\frac{b}{2a} = -\frac{6}{2}$

$= -3$

$y = 9 - 18 + 5$
$= -4$

Vertex point $(-3, -4)$

b) line of Symmetry: $x = -3$

c) Min point @ $(-3, -4)$

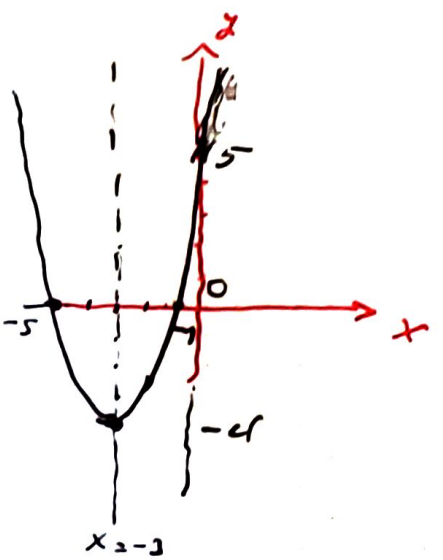
d) $x = -1, -5$

e) $(0, 5)$

f) Range: $[-4, \infty]$ Domain: $\mathbb{R}$

h) Inc: $(-3, \infty]$ dec: $(-\infty, -3]$

g) (2)



#16 $f(x) = -2x^2 + 3x - 1$

a) $x = -\frac{b}{2a} = -\frac{3}{-4}$

$= \frac{3}{4}$

$y = -2\left(\frac{9}{16}\right) + 3\left(\frac{3}{4}\right) - 1$

$= -\frac{9}{8} + \frac{9}{4} - 1$

$= \frac{9}{8} - 1$ $\quad (-)\frac{(a)}{(b)} - 1 = \frac{a-b}{b}$

$= \frac{1}{8}$

Vertex point: $\left(\frac{3}{4}, \frac{1}{8}\right)$

b) line of symmetry: $x = \frac{3}{4}$

c) Max. point @ $\left(\frac{3}{4}, \frac{1}{8}\right)$

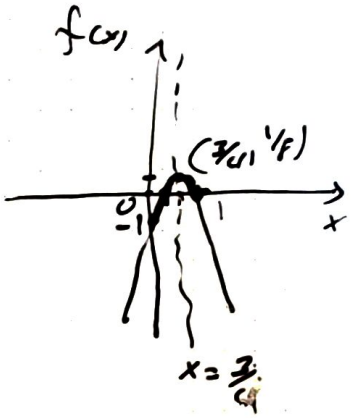
d) $x = 1, \frac{1}{2}$

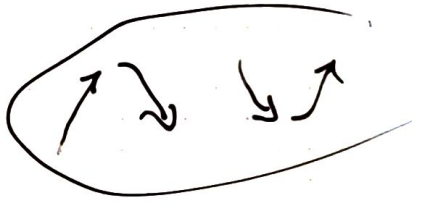
e) $y = -1$

f) Range $(-\infty, \frac{1}{8}]$ Domain: $\mathbb{R}$

h) Inc: $(-\infty, \frac{3}{4})$ Dec: $(\frac{3}{4}, \infty)$

g)





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

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

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

$= -4 + 8 + 5$

$= 9$

Vertex point: $(-2, 9)$

b) line of symmetry: $x = -2$

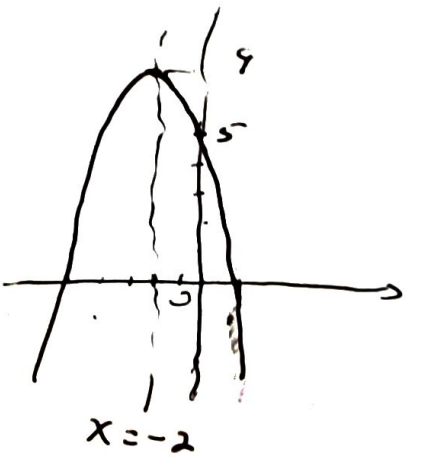
c) Max. point @ $(-2, 9)$

d) $x = +1, -5$

e) y-intercept: $(0, 5)$

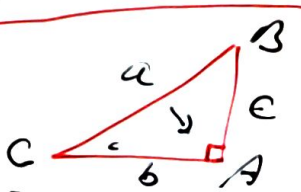
f) Range: $(-\infty, 9]$ domain: $\mathbb{R}$.

g)



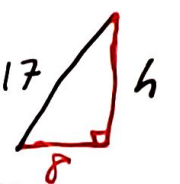
h) Incr: $(-\infty, -2)$ decr: $(-2, \infty)$

1.5



$a^2 = b^2 + c^2$

ex 17 ft (e) $b = 8$



$17^2 = h^2 + 8^2$

$h^2 = 17^2 - 8^2 \rightarrow h = \sqrt{289 - 64}$

$h = 15$ ft $= \sqrt{225}$

1.3 #15 hwk $f(x) = 3x^2 - x + 4$

$$x = \frac{1 \pm \sqrt{1 - 4(3)(4)}}{2(3)}$$

$$= \frac{1 \pm \sqrt{1 - 48}}{6}$$

$$= \frac{1 \pm \sqrt{-47}}{6}$$

$$= \frac{1 \pm i\sqrt{47}}{6} \checkmark = \frac{1}{6} \pm i\frac{\sqrt{47}}{6} \checkmark$$

$a + ib$

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

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

$a + b + c = 0$, $x = 1, c/a$

$a - b + c = 0$, $x = -1, -c/a$