

Quad Functions

① $(x-2)^2-3$ ② $V(2, -3)$ ③ $x=2$ ④ \uparrow ⑤ $\min -3$

⑥ $R: y \geq -3$ ⑦ $\text{incr } x > 2$ ⑧ $y = (0-2)^2-3 = 1$

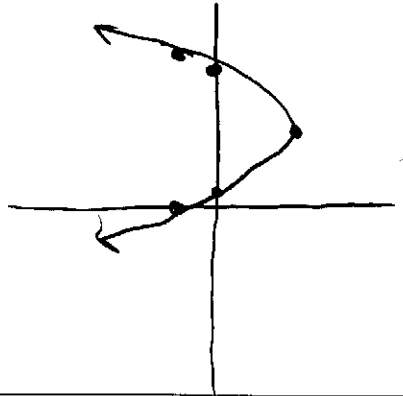
⑨ $\text{decr } x < 2$

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

$\sqrt{3} = \sqrt{(x-2)^2}$

$\pm\sqrt{3} = x-2$

$x = 2 \pm \sqrt{3} \approx 3.73$
 $.27$



② $f(x) = (x+2)^2$ ③ $V(-2, 0)$ ④ $x = -2$ ⑤ \uparrow ⑥ $\min 0$

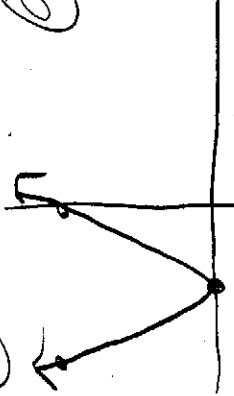
⑦ $R: y \geq 0$ ⑧ $\text{incr } x > -2$ ⑨ $y = (0+2)^2 = 4$

$0 = \sqrt{(x+2)^2}$

$0 = x+2$

$x = -2$

⑩ $\text{decr } x < -2$



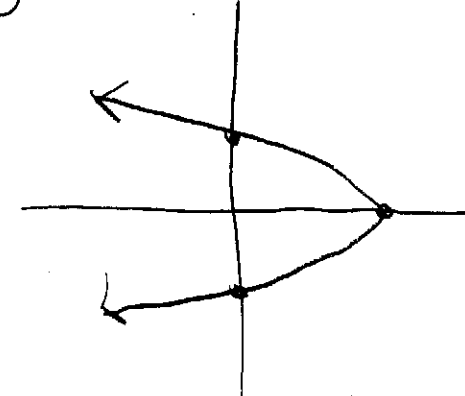
③ $f(x) = x^2-4$ ④ $V(0, -4)$ ⑤ $x=0$ ⑥ \uparrow ⑦ $\min -4$

⑧ $R: y \geq -4$ ⑨ $\text{incr } x > 0$ ⑩ $y = 0^2-4 = -4$

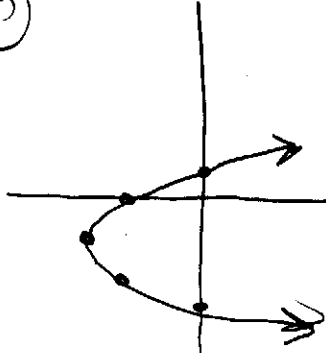
$0 = x^2-4$

$4 = x^2$

$\pm 2 = x$



4 $f(x) = -(x+1)^2 + 3$ (a) $V(-1, 3)$ (b) $x = -1$ (c) \downarrow (d) $\max 3$
 (e) $R: y \leq 3$ (f) $\text{incr } x < -1$ (h) $y = -(0+1)^2 + 3 = 2$
 (g) $\text{decr } x > -1$



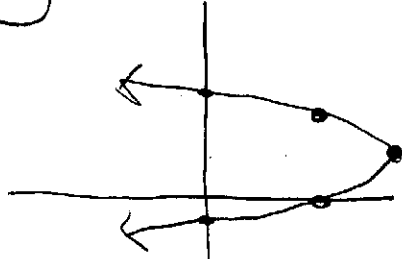
$$-3 = -(x+1)^2$$

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

$$\pm\sqrt{3} = x+1$$

$$x = -1 \pm \sqrt{3} \approx .73, -2.73$$

5 $f(x) = 2(x-1)^2 - 5$ (a) $V(1, -5)$ (b) $x = 1$ (c) \uparrow (d) $\min -5$
 (e) $R: y \geq -5$ (f) $\text{incr } x > 1$ (h) $y = 2(0-1)^2 - 5 = -3$
 (g) $\text{decr } x < 1$



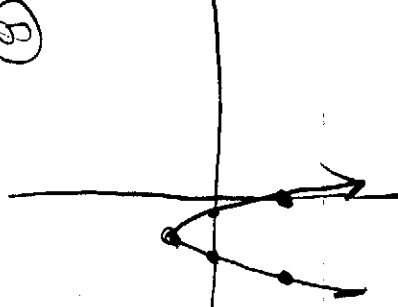
$$5 = 2(x-1)^2$$

$$\sqrt{\frac{5}{2}} = \sqrt{(x-1)^2}$$

$$\pm\sqrt{\frac{5}{2}} = x-1$$

$$x = 1 \pm \sqrt{\frac{5}{2}} \approx 2.58, -.58$$

6 $f(x) = -3(x+1)^2 + 1$ (a) $V(-1, 1)$ (b) $x = -1$ (c) \downarrow (d) $\max 1$
 (e) $R: y \leq 1$ (f) $\text{incr } x < -1$ (h) $y = -3(0+1)^2 + 1 = -2$
 (g) $\text{decr } x > -1$



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

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

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

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

$$x = -1 \pm \sqrt{\frac{1}{3}} \approx -.42, -1.58$$

7) $f(x) = x^2 + 6x + 7$ (b) $V(-3.3, -1.9)$ (c) $\min -1.9$

(d) $R: y \geq -1.9$ (e) $y = 7$

$x = 4.4, -1.59$

$y = 0^2 + 6(0) + 7 = 7$

$0 = x^2 + 6x + 7$

$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(7)}}{2(1)}$

← work

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

8) $f(x) = -x^2 - 2x + 3$ (b) $V(-1, 4)$ (c) $\max 4$

(d) $R: y \leq 4$ (e) $y = 3$

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

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

$x = \frac{2 \pm \sqrt{(-2)^2 - 4(-1)(3)}}{2(-1)} = \frac{2 \pm \sqrt{16}}{-2} = \frac{2 \pm 4}{-2} = \frac{4}{-2}, \frac{-2}{-2}$

9) $f(x) = 3x^2 - 12x + 14$ (b) $V(2, 2)$ (c) $\min 2$

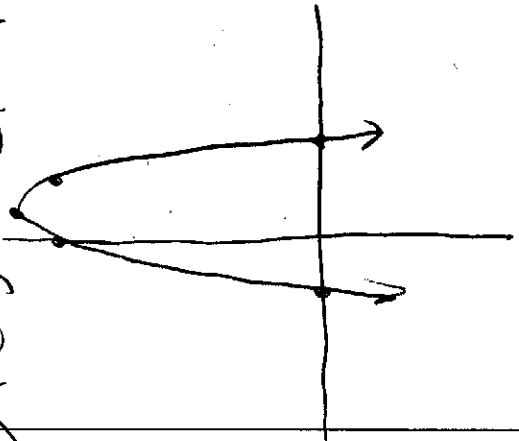
(d) $R: y \geq 2$ (e) $y = 14$

$y = 3(0)^2 - 12(0) + 14 = 14$ $x = \text{none}$

$0 = 3x^2 - 12x + 14$

$x = \frac{12 \pm \sqrt{(-12)^2 - 4(3)(14)}}{2(3)} = \frac{12 \pm \sqrt{-24}}{6}$

10) $f(x) = -2x^2 + 3x + 7$



- ① $x = -1.27, 2.77$
- ② $x = -0.75, 8.125$
- ③ $x = 7$
- ④ $x = 8.125$
- ⑤ $x = 8.125$
- ⑥ $x = 8.125$
- ⑦ $x = 8.125$
- ⑧ $x = 8.125$
- ⑨ $x = 8.125$
- ⑩ $x = 8.125$