

2.3 Piecewise Functions P.70 1-5

1.  $g(x) = \begin{cases} x^2 & \text{if } x \in (-\infty, 0) \\ \sqrt{x} & \text{if } x \in [0, \infty) \end{cases}$

a)  $g(-9) = (-9)^2 = 81$       b)  $g(9) = \sqrt{9} = 3$       c)  $g(0) = \sqrt{0} = 0$       d)  $g(\frac{1}{4}) = \sqrt{\frac{1}{4}} = \frac{1}{2}$

e)  $g(-\frac{1}{4}) = (-\frac{1}{4})^2 = \frac{1}{16}$       f)  $g(-e) = (-e)^2 = e^2$       g)  $g(\pi) = \sqrt{\pi}$

2.  $f(x) = \begin{cases} |2x-1| & \text{if } x \in (-\infty, 3] \\ 2^x & \text{if } x \in (3, 6] \\ x-x^2 & \text{if } x \in (6, \infty) \end{cases}$

a)  $F(10) = 10 - 10^2 = -90$       b)  $F(6) = 2^6 = 64$       c)  $F(3) = |2(3)-1| = 5$       d)  $F(-10) = |2(-10)-1| = 21$

e)  $F(0) = |2(0)-1| = 1$       f)  $F(-4) = |2(-4)-1| = 9$       g)  $F(\frac{7}{2}) = 2^{7/2} = \sqrt{128} = \sqrt{64 \cdot 2} = 8\sqrt{2}$

3.  $h(x) = \begin{cases} x^2 - 20, & x \in (-\infty, -4) \\ x^2 + 10, & x \in [-4, 0) \\ 3x - 5, & x \in [0, \infty) \end{cases}$

a)  $h(x) = -19$

$x^2 - 20 = -19$

$x^2 = 1$

$x = \pm 1$

(not in area)

$x^2 + 10 = -19$

$x^2 = -29$

$\emptyset$

$3x - 5 = -19$

$3x = -14$

$x = -\frac{14}{3}$

(not in area)

None

2.3 - Continued

3 b)  $h(x) = 13$

$$x^2 - 20 = 13$$

$$x^2 = 33$$

$$x = \pm\sqrt{33}$$

in area  $\rightarrow$   $(-\sqrt{33})$

$$x^2 + 10 = 13$$

$$x^2 = 3$$

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

$(-\sqrt{3})$

$$3x - 5 = 13$$

$$3x = 18$$

$$x = 6$$

$(6)$

c)  $h(x) = 5$

$$x^2 - 20 = 5$$

$$x^2 = 25$$

$$x = \pm 5$$

in area  $\rightarrow$   $(-5)$

$$x^2 + 10 = 5$$

$$x^2 = -5$$

$$x = \emptyset$$

$(-\sqrt{5})$

$$3x - 5 = 5$$

$$3x = 10$$

$$x = \frac{10}{3}$$

$(\frac{10}{3})$

d)  $h(x) = 26$

$$x^2 - 20 = 26$$

$$x^2 = 46$$

$$x = \pm\sqrt{46}$$

in area  $\rightarrow$   $(-\sqrt{46})$

$$x^2 + 10 = 26$$

$$x^2 = 16$$

$$x = \pm 4$$

$(-4)$

$$3x - 5 = 26$$

$$3x = 31$$

$$x = \frac{31}{3}$$

$(\frac{31}{3})$

e)  $h(x) = 0$

$$x^2 - 20 = 0$$

$$x^2 = 20$$

$$x = \pm 2\sqrt{5}$$

in area  $\rightarrow$   $(-2\sqrt{5})$

$$x^2 + 10 = 0$$

$$x^2 = -10$$

$$x = \emptyset$$

$$3x - 5 = 0$$

$$3x = 5$$

$$x = \frac{5}{3}$$

$(\frac{5}{3})$

f)  $h(x) = -5$

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

$$x^2 = 15$$

$$x = \pm\sqrt{15}$$

too small

$$x^2 + 10 = -5$$

$$x^2 = -15$$

$$x = \emptyset$$

$$3x - 5 = -5$$

$$3x = 0$$

$$x = 0$$

$(0)$



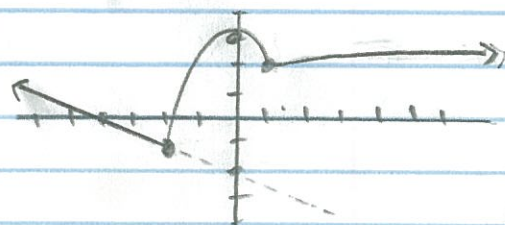
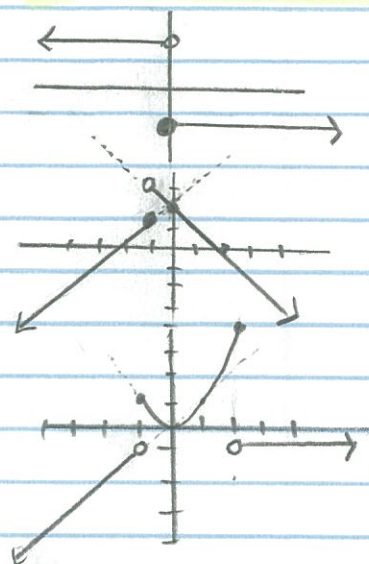
2.3 - continued

4 a)  $f(x) = \begin{cases} 2, & \text{if } x \in (-\infty, 0) \\ -2, & \text{if } x \in [0, \infty) \end{cases}$

b)  $f(x) = \begin{cases} x+2 & \text{if } x \in (-\infty, -1] \\ -x+2 & \text{if } x \in (-1, \infty) \end{cases}$

c)  $f(x) = \begin{cases} x, & \text{if } x \in (-\infty, -1) \\ x^2, & \text{if } x \in [-1, 2] \\ -1, & \text{if } x \in (2, \infty) \end{cases}$

d)  $h(x) = \begin{cases} -\frac{1}{2}x - 2, & \text{if } x \in (-\infty, -2] \\ 3 - x^2, & \text{if } x \in (-2, 1) \\ \sqrt{x+3}, & \text{if } x \in [1, \infty) \end{cases}$



5 a)  $f(x) = \begin{cases} 1, & x \in (-\infty, -3) \\ -2, & x \in [-3, \infty) \end{cases}$

b)  $f(x) = \begin{cases} x+4, & x \in (-\infty, 0) \\ -2x+4, & x \in [0, \infty) \end{cases}$

c)  $f(x) = \begin{cases} 3, & x \in (-\infty, 1) \\ -x+4, & x \in [1, 3] \\ (x-4)^2, & x \in (3, \infty) \end{cases}$  can put [where you want]

d)  $f(x) = \begin{cases} -(x+3)^2+2, & x \in (-\infty, -2) \\ -\sqrt{4-x^2}, & x \in [-2, 2] \\ x-1, & x \in (2, \infty) \end{cases}$

③ parabola  $V(4,0)$   
 $y = a(x-p)^2 + q$

①  $V(-3,2)$  ← parabola  $y = a(x-p)^2 + q$   
 ② semi-circle  $C(0,0) r=2$   
 $(x^2 + y^2 = 4 \quad y = \pm \sqrt{4-x^2}$  ← below only