

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)

$x^2 + 10 = -19$

$x^2 = -29$

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$3x - 5 = -19$

$3x = -14$

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

(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)

$x^2 + 10 = 5$

$x^2 = -5$

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$(-\sqrt{5})$

$3x - 5 = 5$

$3x = 10$

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

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

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 $(-2\sqrt{5})$

$x^2 + 10 = 0$

$x^2 = -10$

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$3x - 5 = 0$

$3x = 5$

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

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

f) $h(x) = -5$

$x^2 - 20 = -5$

$x^2 = 15$

$x = \pm\sqrt{15}$

too small

$x^2 + 10 = -5$

$x^2 = -15$

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$3x - 5 = -5$

$3x = 0$

$x = 0$

(0)



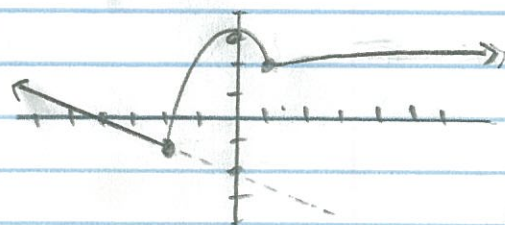
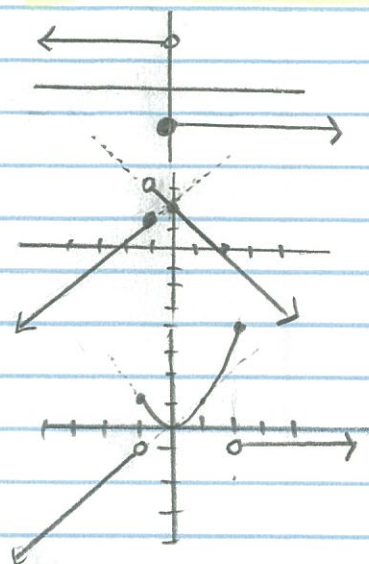
2.3 - continued

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