

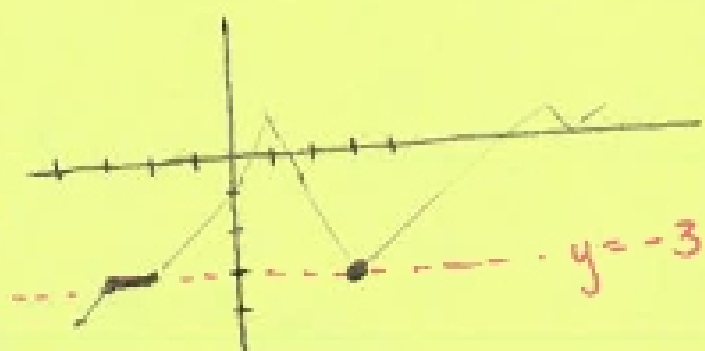
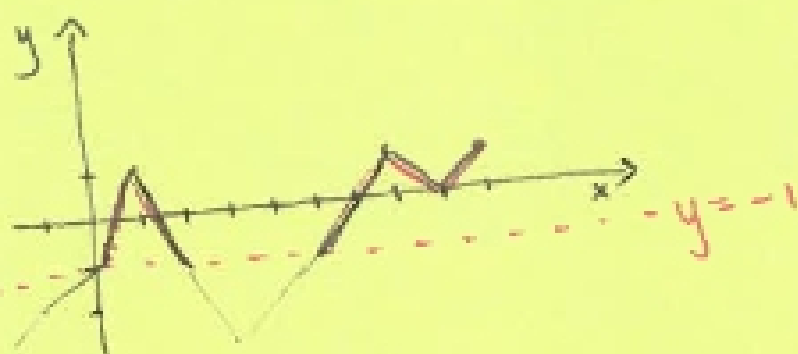
Worksheet 7 Solns

1. a. domain $[-4, 9]$

b. range $[-4, 1]$

c. $[0, 2] \cup [5, 9]$

d. $[-3, -2] \cup \{3\}$



2. a. $(-\infty, -4) \cup (-4, \infty)$

b. $(-\infty, \infty)$

c. $f(1) = 3$

d. $x = -5, -3, 3$

3. a. $(f \circ g)(x) = f(g(x)) = f\left(\frac{2}{3x+2}\right) = \sqrt{\frac{2}{3x+2} - 4}$

b. $(g \circ f)(x) = g(f(x)) = g(\sqrt{x-4}) = \frac{2}{3\sqrt{x-4} + 2}$

c. $(g \circ g)(x) = g(g(x)) = g\left(\frac{2}{3x+2}\right) = \frac{2}{3\left(\frac{2}{3x+2}\right) + 2} = \frac{2}{\frac{6}{3x+2} + \frac{2(3x+2)}{3x+2}} = \frac{2}{\frac{6+6x+4}{3x+2}} = \frac{2}{1} \cdot \frac{3x+2}{6x+10} = \frac{3x+2}{3x+5}$

d. $(f+g)(5) = f(5) + g(5) = \sqrt{5-4} + \frac{2}{3(5)+2} = \sqrt{1} + \frac{2}{17} = \frac{19}{17}$

e. $\left(\frac{f}{g}\right)(8) = \frac{f(8)}{g(8)} = \frac{\sqrt{8-4}}{\frac{2}{3(8)+2}} = \frac{\sqrt{4}}{\frac{2}{26}} = \frac{2}{1} \cdot \frac{26}{2} = 26$

f. $g^{-1}(1) \dots$
 solve for x:
 $y = \frac{2}{3x+2}$
 $y(3x+2) = 2$
 $3xy + 2y = 2$
 $3xy = 2 - 2y$

$x = \frac{2-2y}{3y}$
 $g^{-1}(x) = \frac{2-2x}{3x}$

$g^{-1}(1) = \frac{2-2(1)}{3(1)} = \frac{0}{3} = 0$

check $g(0) = \frac{2}{3(0)+2} = \frac{2}{2} = 1 \checkmark$

$$4. \quad g(x) = \sqrt[3]{x} + 1$$

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

$$5. \quad (g \circ f)(3) = g(f(3)) = g(3^2 - 1) = g(8) = \sqrt{\frac{80}{2}} = \sqrt{40} = 2\sqrt{10}$$

$$(g \circ g)(200) = g(g(200)) = g\left(\sqrt{\frac{200}{2}}\right) = g(\sqrt{100}) = g(10) = \sqrt{\frac{10}{2}} = \sqrt{5}$$

$$\frac{(g \circ f)(3)}{(g \circ g)(200)} = \frac{2\sqrt{10}}{\sqrt{5}} = \frac{2\sqrt{25}}{\sqrt{5}} = \frac{2\sqrt{2} \cdot \sqrt{5}}{\sqrt{5}} = 2\sqrt{2}$$

$$6. \quad y = \frac{x+1}{3-7x} \quad \text{Solve for } x$$

$$y(3-7x) = x+1$$

$$3y - 7xy = x+1$$

$$-1 \quad +7xy \quad -1+7xy$$

$$3y-1 = x+7xy$$

$$3y-1 = x(1+7y)$$

$$x = \frac{3y-1}{1+7y}$$

$$\Rightarrow f^{-1}(x) = \frac{3x-1}{1+7x}$$

$$7. \quad (g \circ f)(x) = g(f(x)) = g\left(\frac{2x-8}{4-x}\right) = 1 - \frac{2}{\frac{2x-8}{4-x}}$$

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

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

$$= 1 + 1 = 2$$