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#21, 27, 35, 39, 43, 53, 59, 61, 69-74, 86

$$21. \quad y = \frac{6}{\sqrt{8-x}}$$

$$\sqrt{8-y} \quad x = \frac{6}{\sqrt{8-y}} \cdot \sqrt{8-y}$$

$$\frac{x \sqrt{8-y}}{x} = \frac{6}{x}$$

$$\sqrt{8-y} = \frac{6}{x}$$

$$8-y = \frac{36}{x^2}$$

$$8-y = \frac{36}{x^2} - 8$$

$$y = -\frac{36}{x^2} + 8$$

$$27. \quad (f \circ g)(x) = -6 \left(\frac{3-x}{6} \right) + 3$$

$$= -(3-x) + 3$$

$$= -3 + x + 3$$

$$= x$$

$$(g \circ f)(x) = \frac{3 - (-6x+3)}{6}$$

$$= \frac{3 + 6x - 3}{6}$$

$$= \frac{6x}{6}$$

$$= x$$

$$35. \quad (f \circ g)(x) = \frac{\frac{4}{x-1} + 4}{\frac{4}{x-1}}$$

$$= \frac{\frac{4}{4(x-1)} + \frac{16(x-1)}{4(x-1)}}{\frac{4}{x-1}}$$

$$= \frac{\frac{16 + 16x - 16}{4(x-1)}}{\frac{4}{x-1}}$$

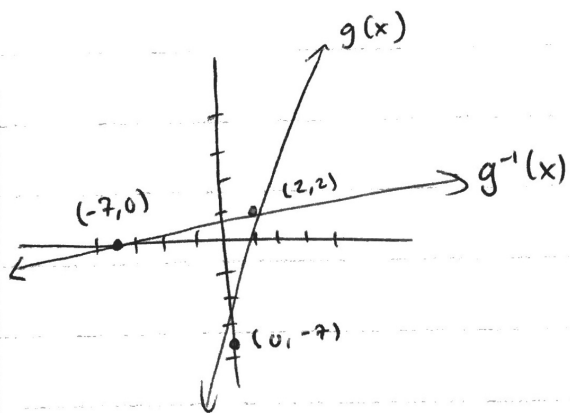
$$= \frac{\frac{16x}{4(x-1)}}{\frac{4}{x-1}} = \frac{16x}{4(x-1)} \cdot \frac{x-1}{4} = \frac{16x}{16} = x$$

$$(g \circ f)(x) = \frac{\frac{4}{x+4} - 1}{\frac{4}{x+4}}$$

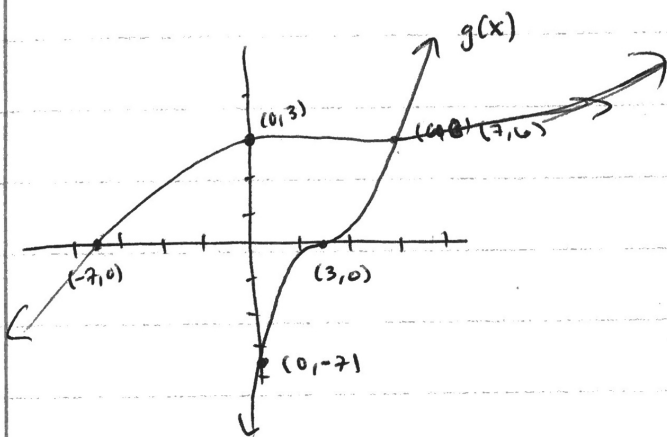
$$= \frac{\frac{4}{x+4} - \frac{x}{x+4}}{\frac{4}{x+4}}$$

$$= \frac{\frac{4-x}{x+4}}{\frac{4}{x+4}} = \frac{4-x}{4} \cdot \frac{x+4}{x+4} = x$$

39.



43.



53. has an inverse b/c it passes horizontal line test.

x	8	7	6	5	4	3
$f^{-1}(x)$	-10	-9	-8	-7	-6	-5

59. domain of $f(x)$: $x-6 \geq 0$
 $x \geq 6$ domain of $f^{-1}(x)$: ~~all~~ \mathbb{R} f^{-1} exists.range of $f(x)$: $y \geq 0$ range of $f^{-1}(x)$: $y \geq 6$ 61. domain of $f(x)$: $x-4 \neq 0$
 $x \neq 4$ domain of $f^{-1}(x)$: $x \neq 3$ f^{-1} exists.range of $f(x)$: $y \neq 3$ range of $f^{-1}(x)$: $x \neq 4$

$$69. f^{-1} = x = 8y - 4 \quad g^{-1} = x = 2y + 6 \quad (f^{-1} \circ g^{-1}) = \frac{\frac{x-6}{2} + 4}{8}$$

$$x + 4 = 8y \quad x - 6 = 2y$$

$$\frac{x+4}{8} = y \quad \frac{x-6}{2} = y$$

$$= \frac{\frac{x-6}{2} + \frac{8}{2}}{8} = \frac{\frac{x+2}{2}}{8} = \frac{x+2}{2} \cdot \frac{1}{8} = \frac{x+2}{16}$$

$$70. (g^{-1} \circ f^{-1}) = \frac{\frac{x+4}{8} - 6}{2} = \frac{\frac{x+4}{8} - \frac{48}{8}}{2} = \frac{\frac{x-44}{8}}{2} = \frac{x-44}{8} \cdot \frac{1}{2} = \frac{x-44}{16}$$

$$71. (f \circ g) = 8(2x+6) - 4 \quad (f \circ g)^{-1} \quad x = 16y + 44$$

$$= 16x + 44 \quad x - 44 = 16y$$

$$\frac{x-44}{16} = y$$

$$72. (g \circ f) = 2(8x-4) + 6 \quad (g \circ f)^{-1} = x = 16y - 2$$

$$= 16x - 2 \quad \frac{x-2}{16} = y$$

~~$$73. (f \circ g) = 16x^2 + 40x - 24$$

$$(f \circ g)^{-1} \quad x = 16y^2 + 40y - 24$$

$$x = 8(2y^2 + 5y - 3)$$

$$\frac{x}{8} = 2y^2 + 5y - 3$$

$$\frac{x}{8} + 3 = 2y^2 + 5y$$~~

$$74. \frac{x+4}{8} \cdot \frac{x-6}{2} = \frac{x^2 - 2x - 24}{16}$$

~~$$86. y = x^3 - ax + 8$$

$$x = y^3 - ay + 8$$

$$x - 8 = y^3 - ay$$

$$x - 8 = y(y^2 - a)$$~~

$$f^{-1}(23) = 3 \rightarrow f(3) = 23$$

$$y = x^3 - ax + 8$$

$$23 = (3)^3 - a(3) + 8$$

$$23 = 17 - 3a$$

$$6 = -3a$$

$$\boxed{-2 = a}$$