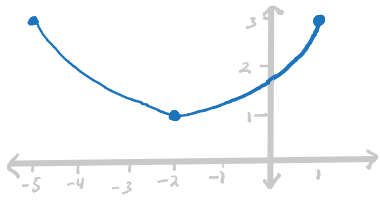
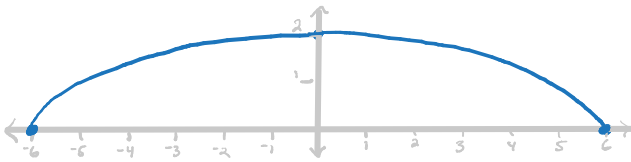


HOMEWORK 2 (SOLUTIONS)

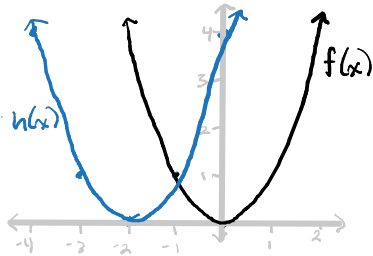
64)



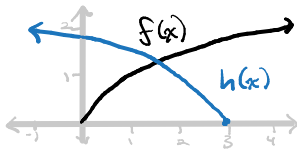
66)



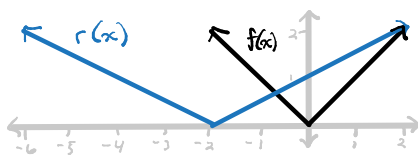
70)



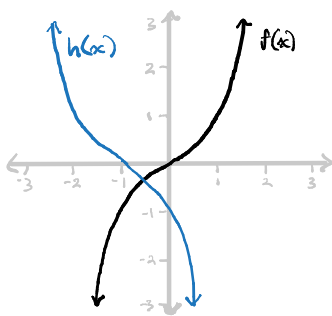
74) NOTE: $\sqrt{3-x} = \sqrt{-(x-3)}$



78)



80)



86) DOMAIN: $(-\infty, 7) \cup (7, \infty)$, OR $\{x \mid x \neq 7\}$

90) $\sqrt{x-1}$ HAS DOMAIN $[1, \infty)$ AND $\sqrt{x+5}$ HAS DOMAIN $[-5, \infty)$,
 SO $\sqrt{x-1} + \sqrt{x+5}$ HAS DOMAIN $[1, \infty)$, OR $\{x \mid 1 \leq x < \infty\}$.

92) $f+g = (x^2+x+1) + (x^2-1) = 2x^2+x$. DOMAIN: $(-\infty, \infty)$.

$f-g = (x^2+x+1) - (x^2-1) = x+2$. DOMAIN: $(-\infty, \infty)$.

$fg = (x^2+x+1)(x^2-1) = (x^4+x^3+x^2-x^2-x-1)$
 $= x^4+x^3-x-1$. DOMAIN: $(-\infty, \infty)$.

$\frac{f}{g} = \frac{x^2+x+1}{x^2-1}$. DOMAIN: $(-\infty, -1) \cup (1, 1) \cup (1, \infty)$ OR $\{x \mid x \neq \pm 1\}$.

94) a) $f \circ g(x) = f(g(x)) = f(4x-1) = (4x-1)^2 + 3 = (16x^2 - 8x + 1) + 3 = 16x^2 - 8x + 4$

b) $g \circ f(x) = g(f(x)) = g(x^2+3) = 4(x^2+3) - 1 = 4x^2 + 12 - 1 = 4x^2 + 11$.

c) $f \circ g(3) = 16(3)^2 - 8(3) + 4 = 144 - 24 + 4 = 124$.

98) LET $f(x) = x^4$, $g(x) = x^2 + 2x - 1$. THEN

$f \circ g(x) = f(g(x)) = f(x^2 + 2x - 1) = (x^2 + 2x - 1)^4 = h(x)$.

100) $f(g(x)) = \frac{3}{5}(\frac{5}{3}x - 2) + \frac{1}{2} = x - \frac{6}{5} + \frac{1}{2} = x - \frac{12}{10} + \frac{5}{10} = x - \frac{7}{10}$

$g(f(x)) = \frac{5}{3}(\frac{3}{5}x + \frac{1}{2}) - 2 = x + \frac{5}{6} - 2 = x + \frac{5}{6} - \frac{12}{6} = x - \frac{7}{6}$

f AND g ARE NOT INVERSES OF EACH OTHER.

102) a) $x = 4y - 3$

$x + 3 = 4y$

$\frac{1}{4}x + \frac{3}{4} = f^{-1}(x)$

b) $f(f^{-1}(x)) = 4(\frac{1}{4}x + \frac{3}{4}) - 3 = x + 3 - 3 = x$

$f^{-1}(f(x)) = \frac{1}{4}(4x - 3) + \frac{3}{4} = x - \frac{3}{4} + \frac{3}{4} = x$

YES, $f^{-1}(x) = \frac{1}{4}x + \frac{3}{4}$

$$104) a) x = \frac{2}{y} + 5$$

$$x - 5 = \frac{2}{y}$$

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

$$b) f(f^{-1}(x)) = \frac{2}{\left(\frac{2}{(x-5)}\right)} + 5 = (x-5) + 5 = x$$

$$f^{-1}(f(x)) = \frac{2}{\left[\left(\frac{2}{x} + 5\right) - 5\right]} = \frac{2}{\left(\frac{2}{x}\right)} = x.$$

YES, THEY ARE INVERSES OF EACH OTHER.

106) FUNCTION IS NOT ONE-TO-ONE. NO INVERSE.

108) FUNCTION IS NOT ONE-TO-ONE. NO INVERSE.

$$122) a) f = 0.05x + 15$$

$$b) g = 0.07x + 5$$

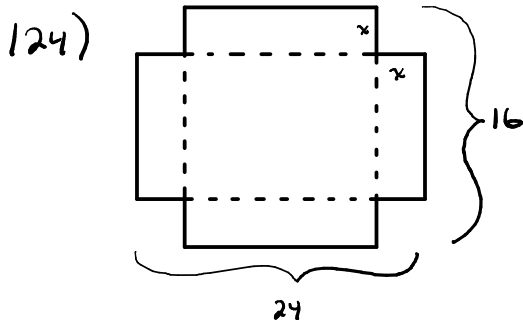
$$c) f = g \Rightarrow 0 = f - g$$

$$= (0.05x + 15) - (0.07x + 5)$$

$$= -0.02x + 10$$

$$0.02x = 10$$

$$x = 500 \text{ MINUTES.}$$



$$a) V = lwh = (24-x)(16-x)x$$

$$= (384 - 32x - 48x + 4x^2)x$$

$$= (384 - 80x + 4x^2)x$$

$$= 4x^3 - 80x^2 + 384x$$

b) NEGATIVE LENGTHS DON'T MAKE SENSE, SO $16 - 2x \geq 0$

$$16 \geq 2x$$

$$8 \geq x$$

$$\text{DOMAIN} = [0, 8] \text{ OR } \{x \mid 0 \leq x \leq 8\}$$

$$126) \quad V = x^2 y = 8 \text{ ft}^3$$

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

$$A = 2x^2 + 4xy$$

$$= 2x^2 + 4x \left(\frac{8}{x^2} \right)$$

$$= 2x^2 + \frac{32}{x}$$