HW #16 (2.7) 14, 16, 28, 34, 40, 44, 50, 54, 62, 68

14) $g(x) = |x|$

since every number and their negative have the same absolute value...

$|-1| = 1 = |1|$

Then **g is not a one-to-one function**

16) $h(x) = x^3 + 8$

if $x_1 \neq x_2$, then $x_1^3 \neq x_2^3$ and $x_1^3 + 8 \neq x_2^3 + 8$

so **f is a one-to-one function**

28) $f(x) = \frac{3-x}{4}$ $\quad g(x) = 3 - 4x$

$f(g(x)) = f(3-4x) = \frac{3-(3-4x)}{4} = \frac{3-3+4x}{4} = x$ for all x

$g(f(x)) = g\left(\frac{3-x}{4}\right) = 3 - 4\left(\frac{3-x}{4}\right) = 3 - 3 + x = x$ for all x

so, they are inverses

34) $f(x) = \sqrt{4-x^2}$ $\quad 0 \leq x \leq 2$ $\quad g(x) = \sqrt{4-x^2}$ $\quad 0 \leq x \leq 2$

$f(g(x)) = f\left(\sqrt{4-x^2}\right) = \sqrt{4-\left(\sqrt{4-x^2}\right)^2} = \sqrt{4-4+x^2} = \sqrt{x^2} = x$

$f(x) = g(x)$ so, **$g(f(x)) = f(g(x)) = x$ so they are inverses**

40) $f(x) = 3 - 5x$

$y = 3 - 5x \Rightarrow -5x = y - 3$

$x = -\frac{1}{5}(y-3)$ so $\boxed{f^{-1}(x) = \frac{1}{5}(3-x)}$

44) $f(x) = \frac{x-2}{x+2}$

$y = \frac{x-2}{x+2} \Rightarrow (x+2)y = x-2$

$xy + 2y = x - 2$

$xy - x = -(2y+2)$

$x(y-1) = -2(y+1)$

$x = \frac{-2(y+1)}{(y-1)}$ so $\boxed{f^{-1}(x) = \frac{-2(x+1)}{(x-1)}}$

50, 54, 62, 88

50) $f(x) = \frac{2x-1}{x-3}$

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

$xy - 3y = 2x - 1$

$xy - 2x = 3y - 1$

$x(y-2) = 3y - 1$

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

so, $\boxed{f^{-1}(x) = \frac{3x-1}{x-2}}$

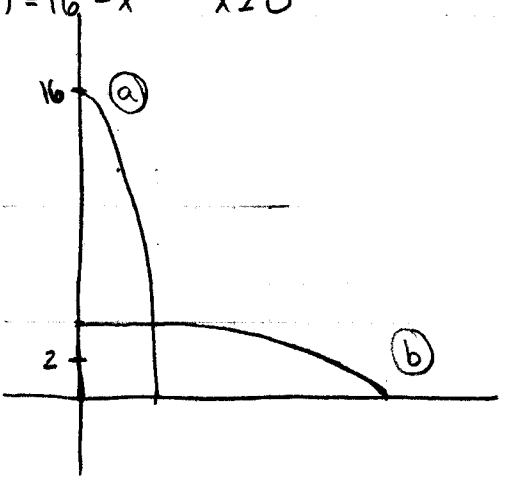
54) $f(x) = \sqrt{2x-1}$

$y = \sqrt{2x-1} \Rightarrow y^2 = 2x - 1$

$y^2 + 1 = 2x$

$\frac{y^2+1}{2} = x$ so, $\boxed{f^{-1}(x) = \frac{x^2+1}{2}}$

62) a) $f(x) = 16 - x^2 \quad x \geq 0$



c) $y = 16 - x^2 \Rightarrow x^2 = 16 - y$

$x = \sqrt{16-y}$

so, $\boxed{f^{-1}(x) = \sqrt{16-x}}$

88) a) $f(x) = 0.85x$

b) $g(x) = x - 1000$

c) $H = f \circ g = f(x-1000) = 0.85(x-1000) = 0.85x - 850$

$y = 0.85x - 850 \Rightarrow y + 850 = 0.85x$

$x = \frac{y+850}{0.85}$ so $\boxed{H^{-1}(x) = 1.176x + 1000}$

e) $H^{-1}(13{,}000) = 1.176(13000) - 1000$

$\boxed{= 16288}$

d) H^{-1} represents the original sticker price for a given discount

so, original price was \$16,288, when the discount price is \$13,000