

# HW 49

P284

$$5. a) f(7) = -4 + 0.5(7-3)^2 \\ = -4 + 0.5(16) \\ = 4$$

$$g(4) = 3 + \sqrt{2(4+4)} \\ = 3 + \sqrt{16} \\ = 7$$

b) They are inverses

$$c) f(1) = -4 + 0.5(1-3)^2 \\ = -4 + 0.5(4) \\ = -2$$

$$g(-2) = 3 + \sqrt{2(-2+4)} \\ = 3 + \sqrt{-4} \text{ [NP]}$$

d)  $g(-2)$  does not work, not inverses now.

e)  $x \geq -4$  because you can't have a negative square root.

$$6. a) 12 = 4 + (x-2)^{3/5} \\ -4 \quad -4 \\ (8)^{5/3} = ((x-2)^{3/5})^{5/3} \\ 32 = x-2 \\ \boxed{34 = x}$$

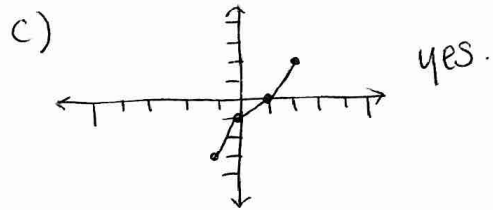
$$b) y = 4 + (x-2)^{3/5} \\ x = 4 + (y-2)^{3/5} \\ x-4 = (y-2)^{3/5} \\ (x-4)^{5/3} = y-2$$

$$\boxed{(x-4)^{5/3} + 2 = f^{-1}(x)} \\ \boxed{\sqrt[3]{(x-4)^5} + 2 = f^{-1}(x)}$$

c) same steps, one the answer is a #, one is an equation.

$$7. a) f(-3) = -1 \\ f(-1) = 0 \\ f(0) = 1 \\ f(2) = 2$$

$$b) (-1, -3), (0, -1), (1, 0), (2, 2)$$



$$8. a) y = 2x - 3 \rightarrow f(x) = 2x - 3$$

$$x = 2y - 3$$

$$x + 3 = 2y$$

$$\frac{x+3}{2} = y \rightarrow f^{-1}(x) = \frac{x+3}{2}$$

$$b) 3x + 2y = 4$$

$$2y = 4 - 3x$$

$$y = \frac{4-3x}{2} \rightarrow f(x) = \frac{4-3x}{2}$$

$$x = \frac{4-3y}{2}$$

$$2x = 4 - 3y$$

$$2x - 4 = -3y$$

$$-\frac{2x-4}{3} = y \rightarrow f^{-1}(x) = \frac{2x-4}{-3}$$

$$c) x^2 + 2y = 3$$

$$2y = -x^2 + 3$$

$$y = \frac{-x^2 + 3}{2} \rightarrow f(x) = \frac{-x^2 + 3}{2}$$

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

$$2x = -y^2 + 3$$

$$2x - 3 = -y^2$$

$$-2x + 3 = y^2$$

$$\pm\sqrt{-2x+3} = y \rightarrow \text{not a function}$$

MAKE SURE YOU SHOW YOUR WORK.

9. a)  $f(x) = 6.34x - 140$   
 $f^{-1}(x) = \frac{x + 140}{6.34}$
- i.  $f^{-1}(x) = \frac{x + 140}{6.34}$   
 ii.  $f(f^{-1}(15.75)) = 15.75$   
 iii. 15.75  
 iv. x
- b)  $f(x) = 1.8x + 32$   
 i.  $f^{-1}(x) = \frac{x - 32}{1.8}$   
 ii. 15.75  
 iii. 15.75  
 iv. x

**WKST**

1.  $h(x) = 5x^2$   
 $y = 5x^2$   
 $x = 5y^2$   
 $\frac{x}{5} = y^2$   
 $\pm \sqrt{\frac{x}{5}} = y$  <sup>NOT a function</sup>

2.  $j(x) = \frac{1}{x} - 2$   
 $y = \frac{1}{x} - 2$   
 ~~$y + 2 = \frac{1}{x}$~~   
 $x = \frac{1}{y + 2}$   
 $x + 2 = \frac{1}{y}$   
 $y = \frac{1}{x + 2}$   
 $j^{-1}(y) = \frac{1}{x + 2}$

3.  $k(x) = 2x^3 + 3$   
 $y = 2x^3 + 3$   
 $x = 2y^3 + 3$   
 $x - 3 = 2y^3$   
 $\frac{x - 3}{2} = y^3$   
 $(\frac{x - 3}{2})^{1/3} = y$   
 $\sqrt[3]{\frac{x - 3}{2}} = y$   
 $k^{-1}(x) = \sqrt[3]{\frac{x - 3}{2}}$

4.  $m(x) = \sqrt[5]{x - 9}$   
 $y = \sqrt[5]{x - 9}$   
 $x = \sqrt[5]{y - 9}$   
 $x^5 = y - 9$   
 $x^5 + 9 = y$   
 $m^{-1}(x) = \sqrt[5]{x - 9} + 9$

5.  $n(x) = \frac{3}{2x}$   
 $y = \frac{3}{2x}$   
 $x = \frac{3}{2y}$   
 $2yx = 3$   
 $y = \frac{3}{2x}$   
 $n^{-1}(x) = \frac{3}{2x}$

$$6. p(x) = (x-1)^3 + 2$$

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

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

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

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

$$\sqrt[3]{x-2} = y-1$$

$$\sqrt[3]{x-2} + 1 = y$$

$$\boxed{p^{-1}(x) = \sqrt[3]{x-2} + 1}$$

$$7. r(x) = 3x^2 - 4$$

$$y = 3x^2 - 4$$

$$x = 3y^2 - 4$$

$$x+4 = 3y^2$$

$$\frac{x+4}{3} = y^2$$

$$\boxed{\pm \sqrt{\frac{x+4}{3}} = y} \text{ not a function}$$

$$8. w(x) = x^{3/5}$$

$$y = (x^{3/5})^{5/3}$$

$$(x)^{5/3} = (y^{3/5})^{5/3}$$

$$x^{5/3} = y$$

$$\boxed{w^{-1}(x) = x^{3/5}}$$

13-18 see next page.

$$9. f(x) = 9 - 2x$$

way 1:

$$1 = 9 - 2x$$

$$-8 = -2x$$

$$4 = x$$

$$f^{-1}(1) = 4$$

or  $f(x) = 9 - 2x$

$$y = 9 - 2x$$

$$x = 9 - 2y$$

$$x - 9 = -2y$$

$$\frac{x-9}{-2} = f^{-1}(x)$$

$$f^{-1}(1) = \frac{1-9}{-2} = 4.$$

$$10. g(x) = \frac{x+3}{4}$$

$$-2 = \frac{x+3}{4}$$

$$-8 = x+3$$

$$-11 = x$$

$$\boxed{g(-2) = -11}$$

$$11. h(x) = 3\sqrt{x}$$

$$y = 3\sqrt{x}$$

$$x = 3\sqrt{y}$$

$$\frac{x}{3} = \sqrt{y}$$

$$\left(\frac{x}{3}\right)^2 = h^{-1}(x)$$

$$h^{-1}(2) = \left(\frac{2}{3}\right)^2 = \frac{4}{9}$$

$$12. -1 = \frac{2}{x-1}$$

$$-x+1 = 2$$

$$-x = 1$$

$$\boxed{x = -1}$$

$$\boxed{k^{-1}(-1) = -1}$$