P.3

INVERSES - FLIP x & y!

* Reflection over $y=x$ gives the inverse!

Ex 6: $R = \{(1,3),(1,-1),(1,-3),(1,1)\}$

Is R a function? no - x repeats

R^{-1} = find the inverse of R!

~~Is the inverse a function?~~ $\{(3,1),(-1,1),(-3,1),(1,1)\}$ (R^{-1} is a function)

Steps for determining the inverse equation for a function or relation algebraically:

- Switch x and y. Remember that f(x) is notation for the "output" just like "y".
- Solve for 'y' to undo the operations.
- Determine if the inverse is a function. If yes, use function notation. $f^{-1}(x) =$

Ex 7: Find the equation of the inverse of each relation or function. Use your knowledge of functions to determine if the inverse is a function and state yes or no. If yes, use $f^{-1}(x)$ notation for the equation of the inverse.

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

$y = \frac{2x-1}{3}$ - switch, $g(x)$ to y

$3 \cdot x = \frac{2y-1}{3} \cdot 3$ - switch x & y

$3x = 2y - 1$ - solve for y

$+1 \quad +1$

$3x+1 = 2y$

$\frac{3x+1}{2} = \frac{2y}{2}$

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

b) $f(x) = \frac{1}{2}x + 2$

$y = \frac{1}{2}x + 2$

$x = \frac{1}{2}y + 2$

$-2 \quad -2$

$x - 2 = \frac{1}{2}y$

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

$2(x-2) = y$

$2x - 4 = y$

$f^{-1}(x) = 2x - 4$

c) $g(x) = \sqrt{3x-9}$

$y = \sqrt{3x-9}$

$x = \sqrt{3y-9}$

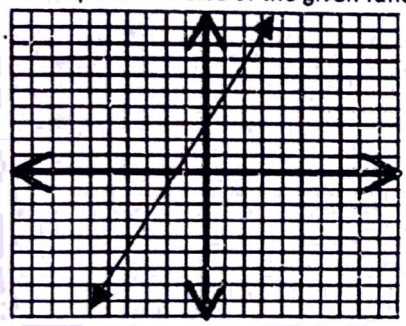
$x^2 = 3y - 9$

d) $h(x) = 4x - 7$

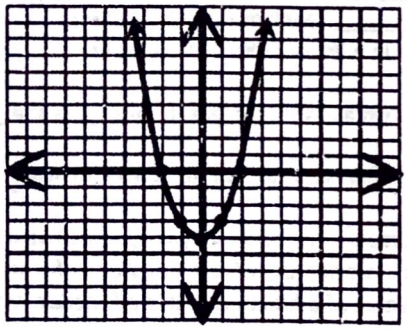
$h^{-1}(x) = \frac{x+7}{4}$

Ex 8: Graph the inverse of the given function. Is the inverse a function?

a.



b.



Ex 9: Use composition to determine whether the functions are inverses of each other.

a. $f(x) = 2x - 3$
$g(x) = -2x + 3$

b. $g(x) = \frac{1}{2}x + 2$
$h(x) = 2x - 4$

yes

$g(h(x)) = g(2x-4)$

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

$x - 2 + 2 = x$ ✓

since $g(h(x)) = h(g(x)) = x$

$h(g(x)) = h(\frac{1}{2}x + 2)$

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