6.4 Inverses

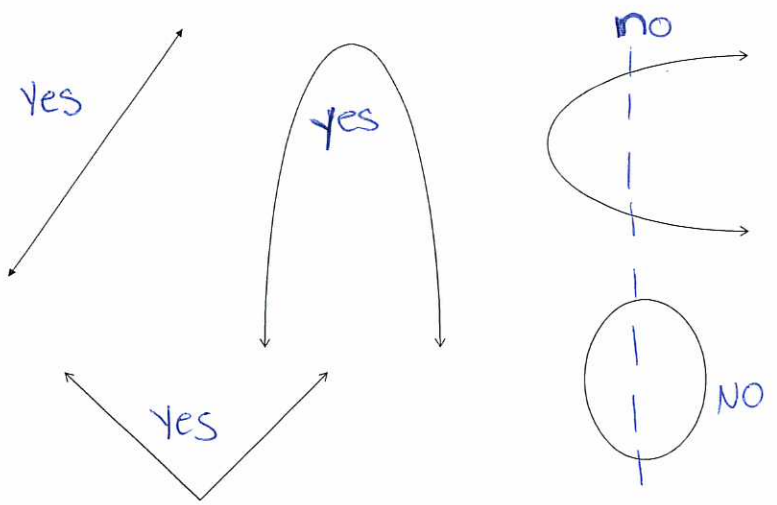
Relation: A set of ordered pairs.

Function: A set of ordered pairs where, for each x, there is only one y. If (The xs can't be repeated.)

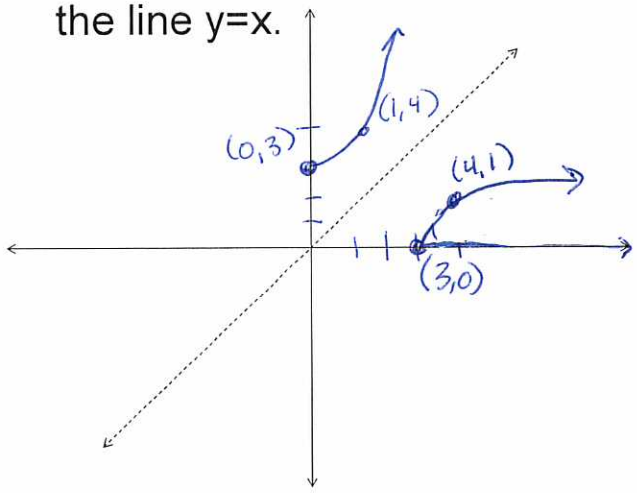
Vertical Line Test:

If any vertical line crosses a graph more than once, it is not a function.

Are the following functions?

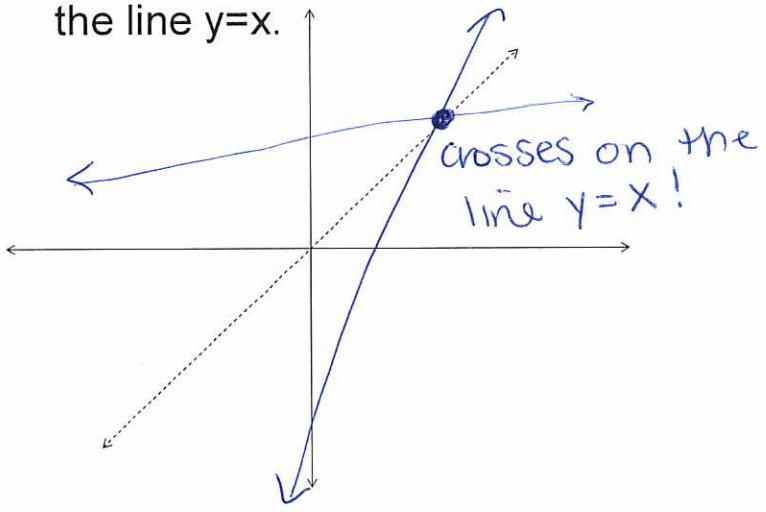


Inverses Functions which are symmetric about the line y=x.



Notation: y^{-1} or $f^{-1}(x)$

Inverses Functions which are symmetric about the line y=x.



Notation: y^{-1} or $f^{-1}(x)$

How to find an inverse:

- Switch x & y
- Solve for y

Ex: $y = -3x + 6$

Inverse: $x = -3y + 6$

$+3y \quad -x \quad +3y \quad -x$

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

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

function NOTATION for inverse of function

$y = \frac{1}{4}x - 8$

Inverse: $x = \frac{1}{4}y - 8$

$-x \quad -\frac{1}{4}y$

$-4\left(-\frac{1}{4}y = -x - 8\right)$

$y^{-1} = 4x + 32$

How to find an inverse:

- Switch x & y
- Solve for y

Ex: $y = \frac{3}{4}x + 15$

$x = \frac{3}{4}y + 15$

$-x \quad -\frac{3}{4}y$

$-\frac{4}{3}\left(-\frac{3}{4}y = -x + 15\right)$

$y^{-1} = \frac{4}{3}x - 20$

$y = \frac{-2}{5}x - \frac{3}{7}$

$x = -\frac{2}{5}y - \frac{3}{7}$

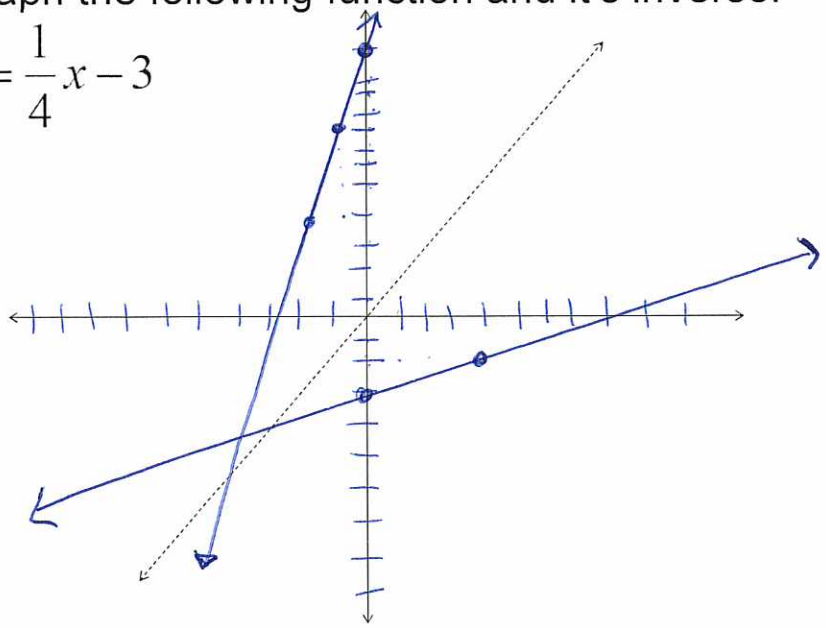
$-x \quad +\frac{2}{5}y$

$\left(\frac{2}{5}y = -x - \frac{3}{7}\right)\frac{5}{2}$

$y^{-1} = -\frac{5}{2}x - \frac{15}{14}$

Graph the following function and it's inverse.

$y = \frac{1}{4}x - 3$



Inverse:

$x = \frac{1}{4}y - 3$

$y = 4x + 12$

Functions are inverses of each other if f(g(x))=x & g(f(x))=x.

Verify that the 2 following functions are inverses of each other.

$y = 2x - 4$

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

$y = x + 4 - 4$

$y = x$

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

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

$y = x - 2 + 2$

$y = x$

Yes!