Inverse of a Relation II (1.4) p51 day 8

1/3 of neurons are in your gut

what are they doing there?

consequences?
food you eat?

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10. For each function $f(x)$,

i) determine the equation of the inverse of $f(x)$ by first rewriting the function in the form $y = a(x - h)^2 + k$

ii) graph $f(x)$ and the inverse of $f(x)$

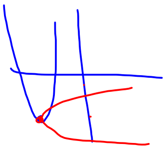
a) $f(x) = x^2 + 8x + 12$

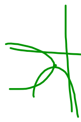
p51 day 8

#6, 10a, 13a b

$y = \underline{x^2 + 8x + 16} - 16 + 12$

$y = (x + 4)^2 - 4$





6. Match the functio

Function

a) $y = 2x + 5$

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

c) $y = 6 - 3x$

d) $y = x^2 - 12,\ x \geq 0$

e) $y = \frac{1}{2}(x + 1)^2,\ x \leq -1$

Inverse

A $y = \sqrt{x + 12}$

B $y = \frac{6 - x}{3}$

C $y = 2x + 8$

D $y = -\sqrt{2x} - 1$

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

13. Determine graphically whether the functions in each pair are inverses of each other.

a) $f(x) = x - 4$ and $g(x) = x + 4$

b) $f(x) = 3x + 5$ and $g(x) = \frac{x - 5}{3}$

$y = ax^2 + bx + c$

$h = p = \frac{-b}{2a}$

$k = q = c - ap^2$

Complete the square

$y = -x^2 + 10x + 3$

$= -(x^2 - 10x) + 3$

$= -(x^2 - 10x + 25 - 25) + 3$

$= -(x^2 - 10x + 25) + 25 + 3$

$y = -(x - 5)^2 + 28$

$x^2 + 4x + 4$

$x^2 + 10x + 25$

$x^2 + 6x + 9$

$(x-5)(x-5)$

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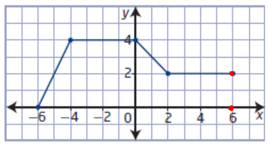
What makes a relation a function?

one y for every x

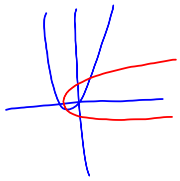
vertical line test



why is this important?

It's nice if the inverse is also a function

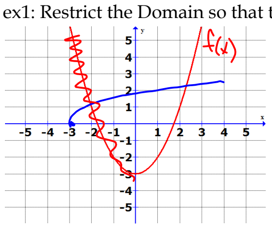
We call this a 1-1 function



Inverse of a Relation II (1.4) p51 day 8

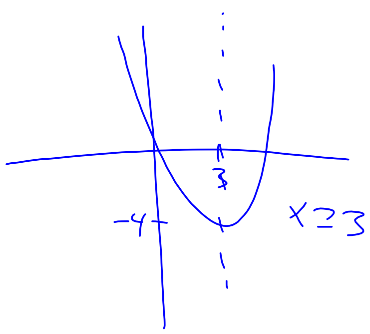
functions are so useful, that we often restrict the domain of a function so that the inverse will also be a function

ex1: Restrict the Domain so that the inverse of y=f(x) is still a function.



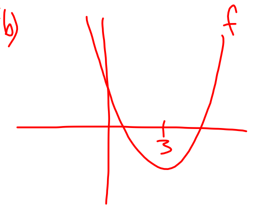
$\boxed{x \geq 0}$

4



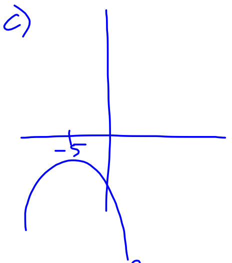
$x \geq 3$

ex4(b)



$x \geq 3$

c)



$x \geq -5$ f

4

Inverse of a Relation II (1.4) *p51* *day 8*

A few other things ...

ex2: What is the mapping for the inverse of $y = 3x^2$?

wait for it...

$$(x, y) \to (y, x)$$ *we're just switching x and y!*

identity

additive inverse 5 -5 =0

multiplicative inverse 7 $\frac{1}{7}$ =1

inverting something takes you back to the identity

Inverse of a Relation II (1.4) *p51* *day 8*

here's another thing...

We use the notation $y = f^{-1}(x)$ to represent an inverse function.

Just to be confusing, this is <u>not</u> the same as the exponent -1, as in

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

It's just a notation.

$Y = 4x - 2$

$x = 4y - 2$

So $f^{-1}(x)$ reads as "the inverse of f of x"

$x + 2 = 4y$

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

15ac

Inverse of a Relation II (1.4) *p51* *day 8*

here's something cool...

Later on, in section 10.3, we'll see how we can make composite functions. For now, we'll see that we can stuff one function inside another. Witness...

ex3: Sub g(x) into f(x) and expand

a) $f(x) = 3x + 1$, $g(x) = 2x - 4$

b) $f(x) = x^2 + 3$, $g(x) = x + 4$

Inverse of a Relation II (1.4) *p51* *day 8*

now for the cool thing

ex4: Find the inverse of y=f(x) and sub it back into the original function.

a) $y = 2x - 1$ b) $y = x^2 + 2$

$x = 2y - 1$

$x + 1 = 2y$

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

$Y = 2\left(\frac{x+1}{2}\right) - 1$

$= x + 1 - 1$

$Y = x$

Inverse of a Relation II (1.4) *p51* *day 8*

HW: p51# 11, 12ace, 20a