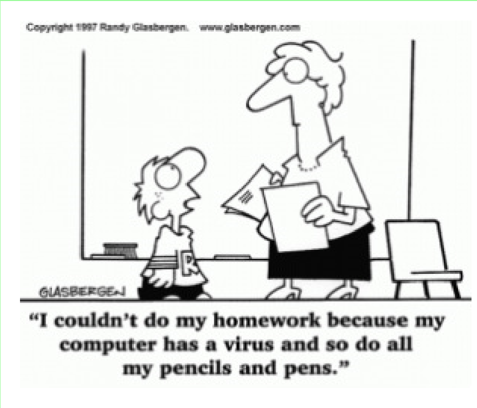
Going over HW (on elmo)



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1.4 Composite functions

A **composite function** is a combination of two functions. You apply one function to the result of another.

→ A **composite function** applies one function to the result of another and is defined by $(f \circ g)(x) = f(g(x))$.

If $f(x) = 5 - 3x$ and $g(x) = x^2 + 4$, find $(f \circ g)(x)$.

Answer	
$(f \circ g)(x) = 5 - 3(x^2 + 4)$ $= 5 - 3x^2 - 12$ $= -3x^2 - 7$	*Substitute $x^2 + 4$ into $f(x)$.*

$g(x)$ goes in here

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$$f(x) = 2x + 1$$
$$g(x) = x^2 - 2$$

$$
\begin{aligned}
(g \circ f)(4) &= g(f(4)) \\
&= g(2(4)+1) \\
&= g(9) \\
&= (9)^2 - 2 \\
&= 79
\end{aligned}
$$

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$$f(x) = 2x + 1$$
$$g(x) = x^2 - 2$$

$$
\begin{aligned}
(g \circ f)(x) &= g(f(x)) \\
&= g(2x+1) \\
&= (2x+1)^2 - 2 \\
&= 4x^2 + 4x + 1 - 2 \\
&= 4x^2 + 4x - 1
\end{aligned}
$$

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$f(x) = 2x+1$

$g(x) = x^2-2$

$$(g\circ f)(x-3) = g(f(x-3))$$
$$= g(2(x-3)+1)$$
$$= g(2x-5)$$
$$= (2x-5)^2-2$$
$$= 4x^2-20x+25-2$$
$$= 4x^2-20x+23$$

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$f(x) = 4x+5$

$g(x) = \frac{x-5}{4}$

$$(f\circ g)(x) = f(g(x))$$
$$= f\left(\frac{x-5}{4}\right)$$
$$= \cancel{4}\left(\frac{x-5}{\cancel{4}}\right)+5$$
$$= x-5+5$$
$$= x$$

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1.5 Inverse functions

→ The **inverse** of a function $f(x)$ is $f^{-1}(x)$. It reverses the action of that function.

If $f(x) = 3x - 4$ and $g(x) = \frac{x+4}{3}$, then

$f(10) = 3(10) - 4 = 26$ and $g(26) = \frac{26+4}{3} = 10$, so we are back to where we started.

So $g(x)$ is the inverse of $f(x)$.

Not all functions have an inverse.

If g is the inverse function of f, then g will reverse the action of f for all values in the domain of f and f will also be the inverse of g.

When f and g are inverse functions, we write $g(x) = f^{-1}(x)$.

$(f \circ g)(10) = 10$

Note that f^{-1} means the inverse of f; the '-1' is not an exponent (power).

→ Functions $f(x)$ and $g(x)$ are inverses of one another if:

$(f \circ g)(x) = x$ for all of the x-values in the domain of g

$(g \circ f)(x) = x$ for all of the x-values in the domain of f.

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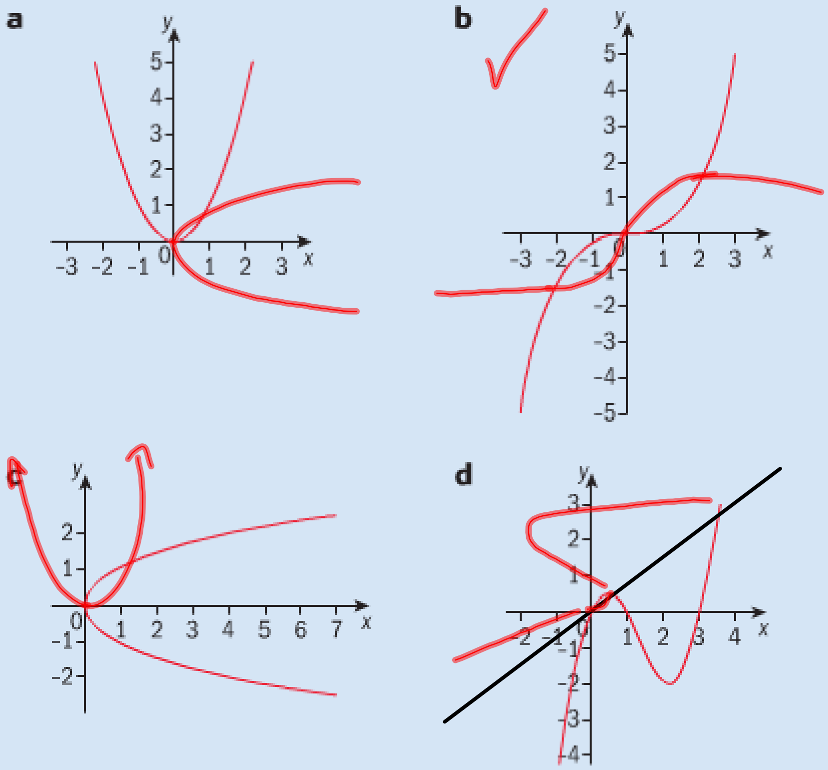
Which of these functions have inverse functions?



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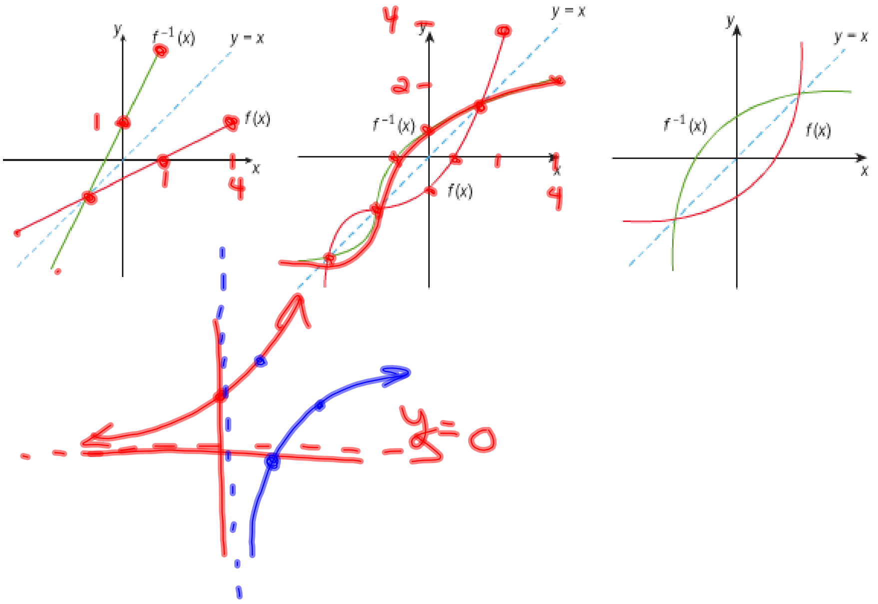
The graphs of inverse functions

→ The graph of the inverse of a function is a reflection of that function in the line $y = x$.

Here are some examples of functions and their inverse functions.



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Homework:

Functions HW # 2 Worksheet

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