Lesson 12

Read Chapter 9

Inverse function

Given $f : A \to B$
the inverse function $f^{-1} :\ B \to A$ if it exists, is such that
$f^{-1}(f(x)) = x$, $f(f^{-1}(y)) = y$
or $f(x) = y$ exactly when $f^{-1}(y) = x$

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

The graph of $f^{-1}(y)$ is the graph of $f(x)$ flipped around the line $y = x$

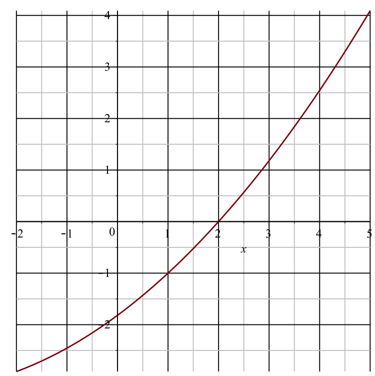
Domain f^{-1}= Range f
Range f^{-1} = Domain f

Does $f(x) = x^2$ have an inverse function ?

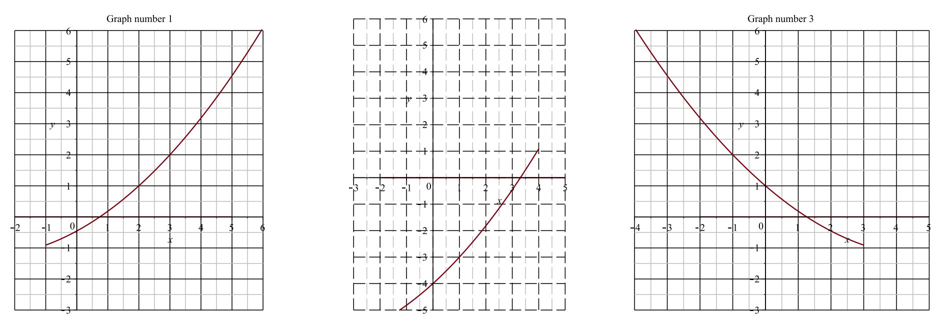
Let $f(x) = 2x - 1$ on the domain of all Real numbers. Is f invertible ? If it is find the inverse , its domain and its range.

Given $g(x) = 2x - 1$ on the domain $0 \leq x \leq 5$. Is g invertible ? If it is find the inverse , its domain and its range

2. Below is the graph of the function $y = f(x)$ on the domain $-2 \leq x \leq 5$



(a) Which of the graphs below is the graph of $y = 2 + f(x-1)$? Circle the correct graph.



(b) If the domain of f is $-2 \leq x \leq 5$ what is the domain of the function $\frac{f(3x)+5}{x-1}$?

(c) Compute $f^{-1}(-1)$

(d) If $h(x) = e^{f(x)}$ Which of the values below is closest to $h^{-1}(2)$? Circle the the right answer.

0.6 ,-1, 2.5, -2, 3.5

Explain why $f(x) = -2x^2 + 60x$ is not invertible.

What is the inverse of $f(x) = -2x^2 + 60x$ on $[15, +\infty)$

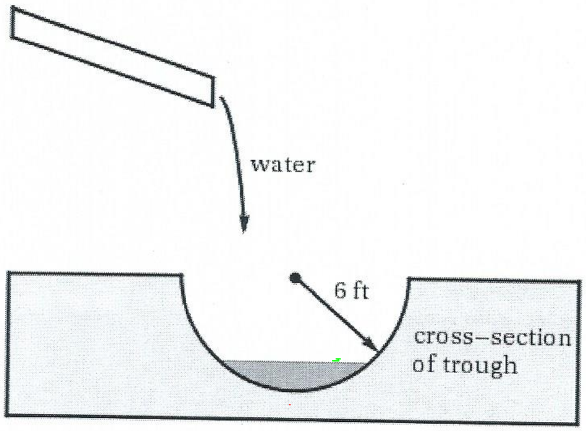
What is the inverse of $f(x) = -2x^2 + 60x$ on $(-\infty, 15]$

$\ln x$ is the inverse of e^x
arcsin x is the inverse of $\sin x$. Over which domain ?

Suppose p is the price of an item and $q = f(p)$ is the number of items sold at that price. Explain in words the meaning of:
$f(25)$

$f^{-1}(30)$

A trough has a semicircular cross section with a radius of 6 feet. Water starts flowing into the trough in such a way that the depth of the water is increasing at a rate of 2 inches per hour.



(a) Give a function
$w = f(t)$
relating the width w, in feet of the surface of the water to the time t, in hours. Make sure to specify the domain and compute the range too.

(b) After how many hours will the surface of the water have width of 7 feet? (Round your answer to two decimal places.)

(c) Give a function
$t = f^{-1}(w)$
relating the time to the width of the surface of the water. Make sure to specify the domain and compute the range too.