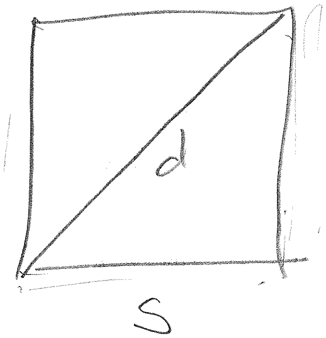
8/27/2012 - Sec P. 4

Math 1060

\# 21 on P. 7



Perimeter = P

Area = A

$A = f(P)$

$A = l \cdot w$

$A = s \cdot s$

$A = s^2$

$A = \left(\frac{P}{4}\right)^2$

$A = \frac{P^2}{4^2}$

$A = \frac{P^2}{16}$ ←

$A = \left(\frac{P}{4}\right)^2$

$P = 4s$

$\frac{P}{4} = \frac{4s}{4}$

$\frac{P}{4} = s$

P.4 Compositions and Inverses

Defn: Composition of functions

If f and g are two functions the <u>composition</u> of f and g, written $f \circ g$, is a function that is defined by

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

Let $f(x) = \sqrt{3x+2}$, $g(x) = 7x$

find $(f \circ g)(x) = f(\underline{g(x)})$

$$= \sqrt{3(7x)+2}$$

$$\boxed{f \circ g(x) = \sqrt{21x+2}}$$

$$(g \circ f)(x) = 7\left(\sqrt{3x+2}\right)$$

$$= 7\sqrt{3x+2}$$

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

$(g \circ f)(x) = 9x^2 - 6x + 2$

$9x^2 - 6x + 3$

$(3x-1)(3x-1)$

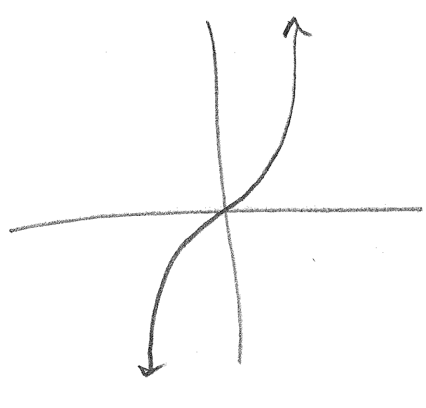
$(3x - 1)^2 + 1$

$9x^2 - 6x + 1 + 1$

$9x^2 - 6x + 2$

One - to One

a function is said to be one-to-one if for each y value there is exactly 1 corresponding x-value

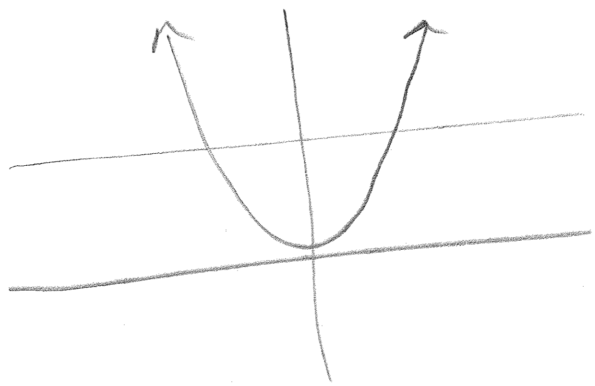


$f(x) = x^3$

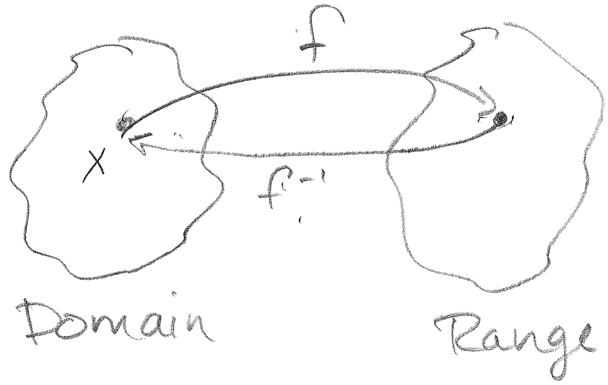
yes is one-to-one

$f(x) = x^2$

Not 1-1



Inverse function



How to find the inverse

1. Replace $f(x)$ with y
2. inter change x with y
3. Solve the equation for y
4. Replace y with $f^{-1}(x)$

$f(x) = 4x - 8$

$y = 4x - 8$

$x = 4y - 8$

$+8 \qquad\quad +8$

$\frac{x+8}{4} = \frac{4y}{4}$

$\frac{x+8}{4} = y$

$f^{-1}(x) = \frac{x+8}{4} = \frac{x}{4} + \frac{8}{4}$

$= \frac{1}{4}x + 2$

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$f^{-1}(x) = x^3 + 9^3$ or $x^3 + 729$

$= \boxed{(x+9)^3}$

$(9 \cdot x)^3 = 9^3 x^3$

$(9+x)^3 = (9+x)(9+x)(9+x)$

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

$f(x) = x^3 + 1$ $f^{-1}(x) = \sqrt[3]{x-1}$

$(f \circ f^{-1})(x) = \left(\sqrt[3]{x-1}\right)^3 + 1$

$= (x-1) + 1$

$= x - 1 + 1$

$= x$ ✓

$(f^{-1} \circ f)(x) = \sqrt[3]{(x^3+1) - 1}$

$= \sqrt[3]{x^3 + \cancel{1} - \cancel{1}}$

$= \sqrt[3]{x^3}$

$= x$ ✓