SAT 6:

10 – 14

On a number line, x represents a number that is within 2 units of 12. Which of the following describes this relationship?

A. $|x + 2| < 12$

B. $|x + 12| < 2$

C. $|x - 2| < 12$

D. $|x - 12| < 2$

E. $|12 - 2| < x$

Operations on Functions

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

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

$= x^2 + x + 3$

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

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

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

Operations on Functions

$f(x) = 2x + 3$

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

The composition of two functions is defined by

$f(x) = 2[g(x)] + 3$ $(f \circ g)(x) = f(g(x))$

$(f \circ g)(x)$

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

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

$(g \circ f)(x)$

$g(f(x))$

$= [f(x)]^2 - f(x)$

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

$= 4x^2 + 10x + 6$

Operations on Functions

$f(x) = x^{10}$

$g(x) = 3x^4 - 1$

$(f \circ g)(x)$

$f(g(x)) = [g(x)]^{10}$

$= (3x^4 - 1)^{10}$

$(g \circ f)(x)$

$g(f(x))$

$= 3[f(x)]^4 - 1$

$= 3(x^{10})^4 - 1$

$= 3x^{40} - 1$

Operations on Functions

$f(x) = \sqrt{4-x^2}$

$g(x) = \sqrt{3 - x}$

$(f \circ g)(x)$

$f(g(x)) = \sqrt{4 - [g(x)]^2}$

$= \sqrt{4 - (\sqrt{3-x})^2}$

$= \sqrt{4-(3-x)} = \sqrt{1+x}$

Operations on Functions

Express h(x) as a composition of two simpler functions.

$h(x) = \sqrt{1+3x^4}$

$h(x) = f(g(x))$

$f(x) = \sqrt{x}$

$g(x) = 1+3x^4$

$h(x) = (4x^3 - 7)^4$

$h(x) = f(g(x))$

$f(x) = x^4$

$g(x) = 4x^3 - 7$

Operations on Functions

$$f(x)=\frac{x-1}{2} \qquad g(x)=2x+1$$

$(f\circ g)(x)$

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

$= \frac{2x}{2}$

$= x$

$(g\circ f)(x)$

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

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

$= x-1+1$

$= x$

Inverse Functions

An inverse function reverses the correspondence between two variables in a function.

$C = \pi d$

$d = \pi C$

$C^{-1} = \frac{d}{\pi}$

$V = s^3$

$s = \sqrt[3]{V}$

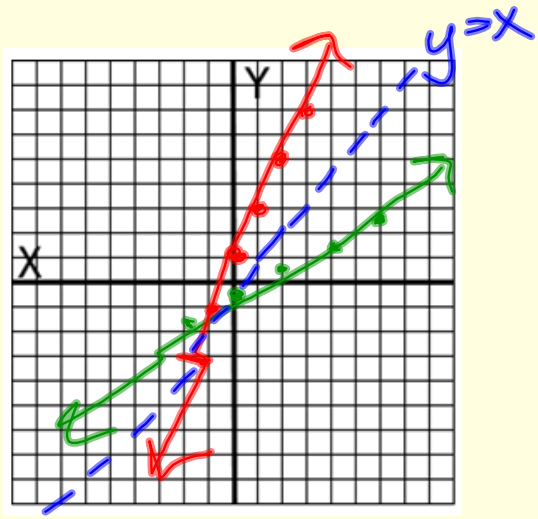
$V^{-1} = \sqrt[3]{s}$

Inverse Functions

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

$= \frac{1}{2}x - \frac{1}{2}$

$\Rightarrow \; g(x) = 2x+1$

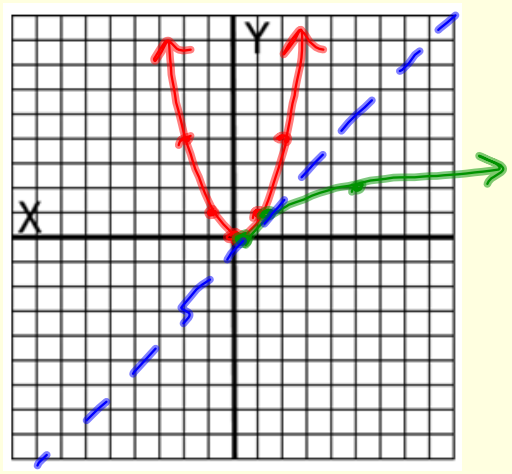


Inverse Functions

$f(x) = x^2$

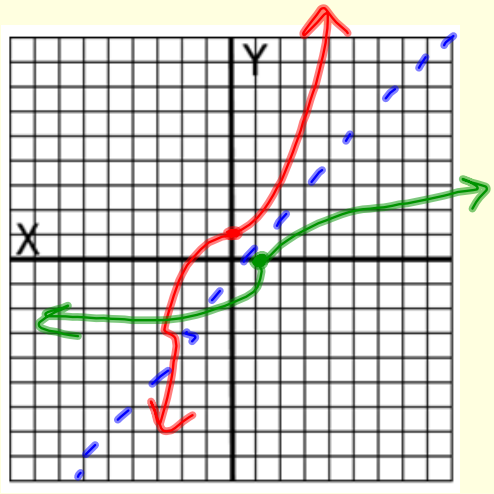
$x = y^2$

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



Inverse Functions

$f(x) = x^3 + 1$



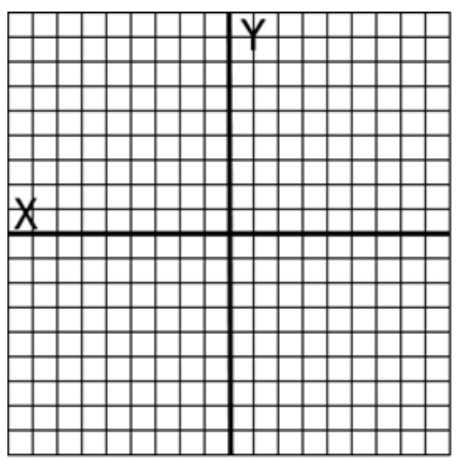
$f^{-1}(x) \rightarrow$

$x = y^3 + 1$

$x - 1 = y^3$

$y = \sqrt[3]{x-1}$

Inverse Functions



Homework

3-5 page 232-233 (45-53 odd, 73-79 odd)

3-6 page 248-249 (31-37 odd, 41, 43, 75-79 odd)

Inverse Functions