

MATH 1010 ~ Intermediate Algebra Chapter 9: EXPONENTIAL AND LOGARITHMIC FUNCTIONS

Section 9.2: Composite and Inverse Functions

Objectives:

- * Form compositions of two functions and find the domain.
- * Use the Horizontal Line Test to determine whether a function has an inverse.
- * Verify that two functions are inverses.
- * Find inverse functions algebraically.

$(f \circ g)(x)$

$f^{-1}(x)$

Composition of Two Functions

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

$$f(x) = 2x^2 + 3 \qquad g(x) = x - 9$$

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

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

① EXAMPLE

Find the compositions. State the domain where applicable.

$$f(x) = \sqrt[3]{x-1} \quad g(x) = 3x^2 + 2$$

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

b) $(f \circ g)(5)$

c) $(g \circ f)(-2)$

② EXAMPLE

Evaluate these.

$$f(x) = x^3 - 1 \quad g(x) = 2x + 5$$

a) $(f \circ g)(0) =$

b) $g(f(2))$

An Inverse Function

Horizontal Line Test

$$g(x) = f^{-1}(x) \quad \text{iff} \quad f(g(x)) = g(f(x)) = x$$

Verify that these are inverse functions.

$$f(x) = 4x^3 - 5 \qquad g(x) = \sqrt[3]{\frac{x+5}{4}}$$

③ EXAMPLE

Find the inverse of each function if it exists.

a) $f(x) = 2x^5 - 1$

b) $g(x) = x^2 + 1$

c) $h(x) = x^3 - 1$