MHF 4UI - Unit 7
Characteristics of Functions

Lesson 1 - Composite Functions

Given two functions f and g, the composite
function f ° g, is defined by $(f \circ g)(x) = f(g(x))$

Example 1: Given that $f(x) = 2x + 9$ and $g(x) = 3x^2 + 4$,
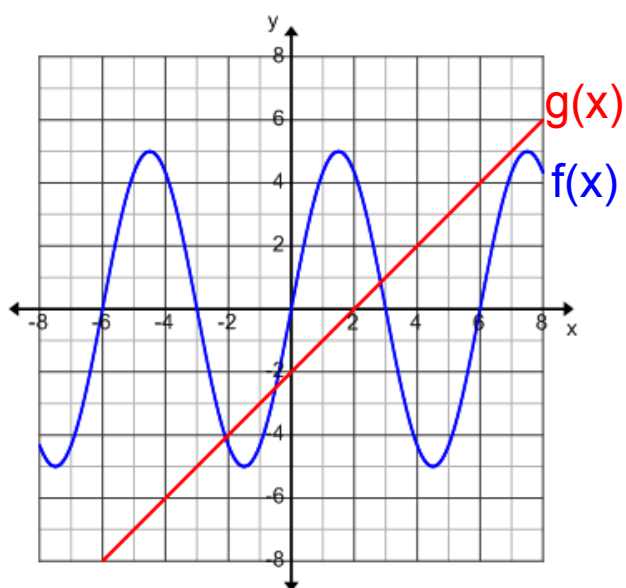Determine:

a) $(f \circ g)(4)$

b) $(g \circ f)(4)$

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

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

NOTICE: $(f \circ g) \neq (g \circ f)$

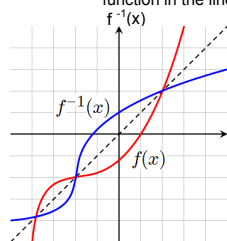Example 2: Given the following two graphs, determine:

a) $(f \circ g)(2)$

b) $(f \circ g)(-4.5)$

c) $(g \circ f)(-4)$

Inverses: An inverse of a function f(x) is the reflection of the
function in the line y = x and uses the notation
f⁻¹(x)

** To find an inverse algebraically remember to switch the x
and y values (then solve for y).

Example 3: Given f(x) = 3x + 1, determine:

a) $f^{-1}(x)$

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

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

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

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

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

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

Example 3. At a certain factory the total cost, C, of manufacturing q units is $C(q) = 0.2q^2 + q + 900$ dollars. It has been determined that approximately $q(t) = t^2 + 100t$ units are manufactured in the first t hours of a production run.

a) Determine the number of units manufactured during the first 6 hours of a productions run.

b) Determine the total cost of manufacturing 636 units.

c) Determine $C \circ q(t)$

d) Determine the total cost of manufacturing during the first
   i) 6 hours

   ii) 200 hours.