COLLEGE ALGEBRA

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GPS # 20 **2.6 COMBINING FUNCTIONS; COMPOSITE FUNCTIONS II** Class Time: 11:30 Date: 2-14-08

Useful Guidelines:

* The composite function, denoted by $f \circ g$ (read as "f composed with g"), is defined by $(f \circ g)(x) = f(g(x))$ (read as "f of g of x".)
* The domain of $f \circ g$ is the subset of the domain of g for which $f \circ g$ is defined.

Very Good!

1. Suppose that $f(x) = x^2 - 1$ and $g(x) = 3x$. Find:

(a) $(f \circ g)(3) = f(g(3)) = (3(3)) = 9 = f(9) = (9)^2 - 1 = 81 - 1 = 80$

(b) $(g \circ f)(-3) = g(f(-3)) = (-3)^2 - 1 = 8 = g(8) = 3(8) = 24$

(c) $(f \circ f)(2)$ $f(f(2)) = (2^2 - 1) = 3 = f(3) = (3)^2 - 1 = 8$

(d) $(g \circ g)(-1)$ $g(g(-1)) = 3(-1) = -3$ $g(-3) = (3)(-3) = -9$

2. Suppose that $f(x) = 2 - x$ and $g(x) = 4x + 1$. Find: (a) $f \circ g$ (b) $g \circ f$ (c) $f \circ f$ $= (f \circ g)(x) = f(g(x))$
State the domain of each composite function.

a.) $f(g(x)) = f(4x+1) = f(x) = 2 - (4x+1) = -4x + 1$ Domain $= (-\infty, \infty)$

b.) $g(f(x)) = g(2-x) = g = 4(2-x) + 1 = (8 - 4x + 1) = -4x + 9$ D: $(-\infty, \infty)$

c.) $f(f(x)) = f(2-x) = f = 2 - (2-x) = 2 - 2 + x = x$ D: $(-\infty, \infty)$

3. Suppose that $f(x) = \dfrac{x+1}{x-1}$ and $g(x) = \dfrac{1}{x}$. Find: (a) $f \circ g$ (b) $g \circ f$

a.) $f(g(x)) = f(1/x) = f(x) = \dfrac{1/x + 1}{1/x - 1} = \dfrac{x(1/x + 1)}{x(1/x - 1)} = \dfrac{1 + x}{1 - x}$ Domain: $(-\infty, 1) \cup (1, \infty)$

b.) $g(fx) = g\left(\dfrac{x+1}{x-1}\right) = g(x) = \left(\dfrac{1}{\frac{x+1}{x-1}}\right) = \dfrac{x-1}{x+1}$ Domain: $(-\infty, 1) \cup (1, \infty)$

4. Suppose the weekly cost for the production and sale of a cabinet is $C(x) = 25x + 4000$ dollars and that the total revenue is given by $R(x) = 80x$, where x is the number of cabinets.

a) Write the equation of the function that models the weekly profit from the production and sale of x cabinets.

$C(x) = 25x + 4000$ $(R - C)(x) = R(x) - C(x)$

$R(x) = 80x$

$P(x)$ $80x - (25x + 4000)$

$= 55x - 4000$

b) What is the profit on the production and sale of 300 cabinets?

$55(300) - 4000 = \$12,500$