COLLEGE ALGEBRA

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GPS # 20 **2.6 COMBINING FUNCTIONS; COMPOSITE FUNCTIONS II** Class Time: T Th 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.

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

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

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

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

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

Good

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

A. $(f \circ g)(x)$

$f(g(x)) =$ $*2 - 4x - 1*$

$f(4x+1) = 2 - (4x+1)$

$-4x + 1$

D: $(-\infty, \infty)$

B. $(g \circ f)(x)$

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

$4(2-x) + 1$

$8 - 4x + 1$

$-4x + 9$

D: $(-\infty, \infty)$

C. $(f \circ f)(x)$ 2b.

$f(f(x)) = f(2-x)$

$2 - (2-x)$

$2 - 2 + x =$

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. $f(g(x))$

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

D: $\{x \mid x \neq 1\}$

B. $g(f(x))$

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

D: $\{x \mid x \neq -1\}$

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.

$C(x) = 25x + 4000$

$R(x) = 80x$

$P(x) = (R - C)(x)$

$80x - (25x + 4000)$

$55x - 4000$

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

$P(300) = 55x - 4000$

$P = \$12500$