COLLEGE ALGEBRA NAME: Brook Bennett

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.

20/20 Good job.

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

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

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

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

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

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

ⓐ $f \circ g = (f \circ g)(x) = f(g(x)) = f(4x+1) = 2 - (4x+1) = -4x+1$ $D: (-\infty, \infty)$

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

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

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

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

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

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

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

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.

$P(x) = (R - C)x = R(x) - C(x)$
$= 80x - (25x - 4000) = 55x - 4000$

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

$55(300) - 4000 = \$12500$