Calculus I
Homework Review: Function Composition
Lecture 1

1. Find the implied domain of the function.

   (a) $f(x) = \dfrac{x+4}{x^2-4}$.

   (b) $f(x) = \dfrac{2x^3-5}{x^2+5x+6}$.

   (c) $f(t) = \sqrt[3]{3t-1}$.

   (d) $g(t) = \sqrt{5-t} - \sqrt{1+t}$.

   (e) $h(x) = \dfrac{1}{\sqrt[6]{x^2-7x}}$.

   (f) $f(u) = \dfrac{u+1}{1+\frac{1}{u+1}}$.

   (g) $F(x) = \sqrt{10-\sqrt{x}}$.

2. Compute the composite functions $(f \circ g)(x)$, $(g \circ f)(x)$. Simplify your answer to a single fraction. Find the domain of the composite function.

   (a) $f(x) = \dfrac{x+2}{x-2}, g(x) = \dfrac{x-1}{x+2}$.

   (b) $f(x) = \dfrac{x+1}{3x-2}, g(x) = \dfrac{x-2}{x-1}$.

   (c) $f(x) = \dfrac{2x+1}{3x-1}, g(x) = \dfrac{x-2}{2x-1}$.

   (d) $f(x) = \dfrac{x+1}{x-2}, g(x) = \dfrac{x+2}{2x-1}$.

   (e) $f(x) = \dfrac{5x+1}{4x-1}, g(x) = \dfrac{4x-1}{3x+1}$.

   (f) $f(x) = \dfrac{3x-5}{x-2}, g(x) = \dfrac{x-2}{x-4}$.

   (g) $f(x) = \dfrac{x-3}{x+2}, g(y) = \dfrac{y+3}{y-4}$.

3. Find the functions $f \circ g$, $g \circ f$, $f \circ f$ and $g \circ g$ and their implied domains. The answer key has not been proofread, use with caution.

   (a) $f(x) = x^2 + 1, g(x) = x + 1$.

   (b) $f(x) = \sqrt{x+1}, g(x) = x + 1$.

   (c) $f(x) = 2x, g(x) = \tan x$.
   In this subproblem, you are not required to find the domain.

   (d) $f(x) = \dfrac{x+1}{x-1}, g(x) = \dfrac{x-1}{x+1}$.