For practise only. Not to be submitted.

1. Simplify each of the following.

   (a) $\dfrac{3x+9}{x^2-1} \cdot \dfrac{x+1}{2x^2+5x-3}$

   (b) $\dfrac{2}{2x-5} + \dfrac{1}{x+1}$

   (c) $\dfrac{1}{9-x^2} + \dfrac{1}{x-3}$

   (d) $\dfrac{x-2}{x-4} - \dfrac{x+3}{x^2-2x-8}$

   (e) $\dfrac{\frac{2}{x+2}-1}{1-\frac{3}{x+3}}$

   (f) $x(x-4)^{-2} + 3(x-4)^{-1}$

2. Solve each of the following equations.

   (a) $\dfrac{2}{x-5} + \dfrac{1}{x+5} = \dfrac{5x-5}{x^2-25}$

   (b) $\dfrac{2}{x-5} + \dfrac{1}{x+5} = \dfrac{5x-1}{x^2-25}$

   (c) $\dfrac{1}{x} + \dfrac{1}{x-6} = -\dfrac{2}{x^2}$

3. Find the domain of $f(x) = \dfrac{3x}{x^2+4x-12}$.

4. Find $(f \circ g)(x)$ and the domain of $f \circ g$ for each of the indicated pairs of functions.

   (a) $f(x) = \dfrac{1}{x+3}, \quad g(x) = \dfrac{1}{x-3}$

   (b) $f(x) = \dfrac{x}{x^2-4}, \quad g(x) = 2-x$

   (c) $f(x) = \dfrac{2}{1-x^2}, \quad g(x) = \sqrt{4-x}$

5. If $f(x) = \dfrac{2}{3x+4}$ find $(f \circ f)(x)$ and state its domain.

6. Let $f(x) = \dfrac{\sqrt{x-3}}{x-5}$. Identify the range of its inverse function without solving for $f^{-1}(x)$ explicitly.