The University of Calgary
Department of Mathematics and Statistics
MATH 249
Worksheet #2

1. For $f(x) = \dfrac{1}{1-x}\left(1 - \dfrac{4}{x+3}\right)$ find $\lim f(x)$
   (a) as $x \to 1$ and
   (b) as $x \to -3^+$
   (c) as $x \to +\infty$.

2. For $f(x) = \sqrt{9-x^2}$ and $g(x) = \dfrac{3}{x-1}$ find the compositions $g \circ g$ and $f \circ g$ and their domains.

3. For $g(x) = \dfrac{4}{2x-8}$ and $f(x) = \sqrt{x^2-9}$ find $g \circ g$ and $g \circ f$ and their domains

4. Find : $\lim \dfrac{1-4x^2}{6x^2-5x+1}$
   (a) as $x \to -\infty$ (b) as $x \to \frac{1}{2}$ (c) as $x \to \frac{1}{3}^-$.

5. Find : $\lim \dfrac{\sqrt{3x}-3}{\sqrt{2x^2-6x}}$
   (a) as $x \to 3^+$, (b) as $x \to +\infty$, (c) as $x \to 0$

6. For $f(x) = \dfrac{\sqrt{3-x}}{x^2-4x+3}$ find $\lim f(x)$
   (a) as $x \to 3^-$ and
   (b) as $x \to 1^+$
   (c) as $x \to +\infty$.

7. For $g(x) = \sqrt{3+x}$ and $f(x) = \sqrt{x-5}$ find the compositions $g \circ g$ and $f \circ g$ and their domains.

8. For $f(x) = \dfrac{|x-3| - |x+3|}{x}$ find $\lim f(x)$
   (a) as $x \to 0$ and
   (b) as $x \to -\infty$
   (c) as $x \to +\infty$.

9. For $g(x) = \sqrt{3-x}$ and $f(x) = \dfrac{6}{3x-1}$ find the compositions $g \circ f$ and $f \circ f$ and their domains