Calculus I
Homework Limits
Lecture 3

1. **The problem is too easy to appear on a quiz or test.** Evaluate the limits. Justify your computations.

   (a) $\lim\limits_{x \to 2} 2x^2 - 3x - 6$.

   (b) $\lim\limits_{x \to -1} \dfrac{x^4 - x}{x^2 + 2x + 3}$.

   (c) $\lim\limits_{x \to -1} \dfrac{1}{x^2 - 3x + 2}$.

   (d) $\lim\limits_{x \to -2} \sqrt{x^4 + 16}$.

   (e) $\lim\limits_{x \to 8} (1 + \sqrt[3]{x})(2 - x)$.

2. Evaluate the limit if it exists.

   (a) $\lim\limits_{x \to 2} \dfrac{x^2 - 5x + 6}{x - 2}$.

   (b) $\lim\limits_{x \to 3} \dfrac{x^2 - 3x}{x^2 - 2x - 3}$.

   (c) $\lim\limits_{x \to -2} \dfrac{2x^2 + x - 6}{x^2 - 4}$

   (d) $\lim\limits_{x \to 2} \dfrac{x^2 - 5x - 6}{x - 2}$.

   (e) $\lim\limits_{x \to -1} \dfrac{x^2 - 3x}{x^2 - 2x - 3}$.

   (f) $\lim\limits_{x \to -2} \dfrac{x^2 - 4}{2x^2 + 5x + 2}$.

   (g) $\lim\limits_{x \to -1} \dfrac{2x^2 + 3x + 1}{3x^2 - 2x - 5}$.

   (h) $\lim\limits_{x \to -4} \dfrac{x^2 + 7x + 12}{x^2 + 6x + 8}$.

   (i) $\lim\limits_{h \to 0} \dfrac{(-3 + h)^2 - 9}{h}$.

   (j) $\lim\limits_{h \to 0} \dfrac{(-2 + h)^3 + 8}{h}$.

   (k) $\lim\limits_{x \to -3} \dfrac{x + 3}{x^3 + 27}$.

   (l) $\lim\limits_{x \to 1} \dfrac{x^4 - 1}{x^3 - 1}$.

   (m) $\lim\limits_{h \to 0} \dfrac{\sqrt{4 + h} - 2}{h}$.

   (n) $\lim\limits_{x \to 3} \dfrac{\sqrt{5x + 1} - 4}{x - 3}$.

   (o) $\lim\limits_{x \to -3} \dfrac{\sqrt{x^2 + 16} - 5}{x + 3}$.

   (p) $\lim\limits_{x \to -3} \dfrac{\frac{1}{3} + \frac{1}{x}}{3 + x}$.

   (q) $\lim\limits_{x \to -2} \dfrac{x^2 + 4x + 4}{x^4 - 16}$.

   (r) $\lim\limits_{x \to 0} \dfrac{\sqrt{1 + x} - \sqrt{1 - x}}{x}$.

   (s) $\lim\limits_{x \to 0} \left(\dfrac{1}{x} - \dfrac{1}{x^2 + x} \right)$.

   (t) $\lim\limits_{x \to 9} \dfrac{3 - \sqrt{x}}{9x - x^2}$.

   (u) $\lim\limits_{h \to 0} \dfrac{(2 + h)^{-1} - 2^{-1}}{h}$.

   (v) $\lim\limits_{x \to 0} \left(\dfrac{1}{x\sqrt{1 + x}} - \dfrac{1}{x} \right)$.

   (w) $\lim\limits_{h \to 0} \dfrac{(x + h)^3 - x^3}{h}$.

   (x) $\lim\limits_{h \to 0} \dfrac{\frac{1}{(x+h)^2} - \frac{1}{x^2}}{h}$.

   (y) $\lim\limits_{h \to 0} \dfrac{\frac{1}{(2+h)^2} - \frac{1}{4}}{h}$.

   (z) $\lim\limits_{h \to 0} \dfrac{\frac{1}{(1+h)^2} - 1}{h}$.