Colby

February 18: Daily Vitamin

This daily vitamin will give you an opportunity to practice some of the concepts and/or calculations presented during class. The daily vitamin is not compulsory and won't be graded but remember: **if you take your vitamins, you'll be stronger for it!**

1. For each function $f(x)$ below, do the following:

   - state whether the one-sided limits $\lim_{x \to a^{\pm}} f(x)$ exist: if so, determine them; if not, explain why.
   - state whether the limit $\lim_{x \to a} f(x)$ exists: if so, determine it; if not, explain why.
   - state whether $f(x)$ is defined at $x = a$.

   You may use a graph in your explanation, if it helps.

   (a) $f(x) = 2x + 5$, $a = -1$.

   (b) $f(x) = \frac{2x}{|x|}$, with $a = 0$.

   (c) $f(x) = \frac{2x}{|x|}$, with $a = 3$.

   (d) $f(x) = \frac{x^2 - 4}{x - 2}$, with $a = 2$.

   (e) $f(x) = \begin{cases} x + 1, & x > 0 \\ 0, & x = 0 \\ -1 - x, & x < 0 \end{cases}$, with $a = 0$.

   Solution:

2. Using the Limit Laws determine the following limits:

(a) $\lim_{x \to 2} 3x^4 - 2x^2 - 5$

(b) $\lim_{x \to -1} (x + 3)(2x^2 - 1)$

(c) $\lim_{x \to 0} \dfrac{2x + 3}{2x - 1}$