MATH153 - Homework 1

Due: March 8

1. Suppose $f(x)$ is even and $\lim_{x \to a^+} f(x) = L$. Find, if possible, the following:

   (a) $\lim_{x \to -a^+} f(x)$

   (b) $\lim_{x \to -a^-} f(x)$

   (c) $\lim_{x \to -a} f(x)$

2. Compute the following limits:

   (a) $\lim_{x \to 0} \dfrac{1 - \cos^2(x)}{x^2}$

   (b) $\lim_{x \to \infty} \dfrac{1 - \cos(x)}{x^2}$

   (c) $\lim_{x \to 2} \dfrac{1 - 3x}{x^3 - 8}$

   (d) $\lim_{x \to \infty} \left(\sqrt{x^6 + x^2 + 1} - x^3 \right)$

3. If
$$f(x) = \begin{cases} x^2 + 5 & \text{if } x < -2 \\ 3 - 3x & \text{if } x \geq -2 \end{cases}$$
   find $\lim_{x \to -2} f(x)$, if exists.