Math 231 Worksheet 1

1. Let
$$f(x) = \begin{cases} x + 2 & \text{if } x \leq -1 \\ x^2 & \text{if } -1 < x \leq 1 \\ 2x & \text{if } x > 1. \end{cases}$$

Evaluate the following limits.

(a) $\lim\limits_{x \to -1} f(x)$ $\qquad$ (b) $\lim\limits_{x \to 1^-} f(x)$ $\qquad$ (c) $\lim\limits_{x \to 1^+} f(x)$ $\qquad$ (d) $\lim\limits_{x \to 1} f(x)$ $\qquad$ (e) $\lim\limits_{x \to 0} f(x)$

2. Compute the functions $f \circ g$ and $g \circ f$. Simplify your answers.
$$f(x) = x^2 - 1, \quad g(x) = 2x + 1$$

3. Evaluate the limit and justify your answers.

(a) $\lim\limits_{x \to 1} \left[2(x + 1)^2 - x^4(x + 3) \right]$ $\qquad\qquad$ (b) $g(x) = \lim\limits_{x \to -1} \dfrac{\sqrt[3]{x - 7}}{\sqrt{x^2 + 1}}$