Math 2A Worksheet: 2.2 Limits

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1. Sketch the graph of the function and use it to determine the values a for which $\lim_{x\to a} f(x)$ exists.

$$f(x) = \begin{cases} -x-2 & \text{if } x \le -1 \\ x^3 & \text{if } -1 < x \le 1 \\ x+1 & \text{if } 1 < x \end{cases}$$

2. Sketch the graph of a function which satisfies all of the given conditions.

$$\lim_{x\to 0} f(x) = -1, \qquad \lim_{x\to 3^-} f(x) = -2, \qquad \lim_{x\to 3^+} f(x) = 2, \qquad f(0) = -1, \quad f(3) = 1$$

3. Determine the infinite limit:

(a) $\lim_{x \to 5^-} \dfrac{x+1}{x-5}$

(b) $\lim_{x \to 3^-} \dfrac{\sqrt{x}}{(x-3)^5}$

(c) $\lim_{x \to 0^+} \ln(\sin x)$

(d) $\lim_{x \to 2^-} \dfrac{x^2 - 2x}{x^2 - 4x + 4}$

(e) $\lim_{x \to \frac{\pi}{2}^+} \tan x$

(f) $\lim_{x \to 0^+} \dfrac{1}{x} - \ln x$