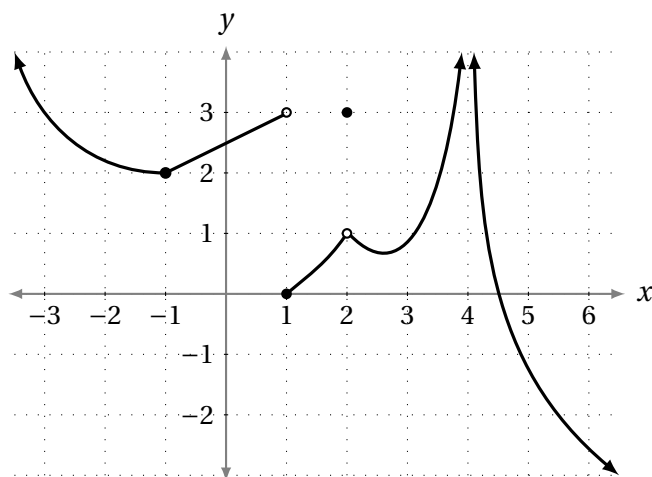**21-120: Differential and Integral Calculus**
Recitation #2 Outline: 08/29/24

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1. The graph of the function $f(x)$ is defined above. For each limit, find the value, find the infinite limit, or state that it doesn't exist (DNE):

    (a) $\lim\limits_{x \to 1^-} f(x) =$ _____

    (b) $\lim\limits_{x \to 1} f(x) =$ _____

    (c) $\lim\limits_{x \to 4} f(x) =$ _____

    (d) $\lim\limits_{x \to -1} f(x) =$ _____

    (e) $\lim\limits_{x \to 2} f(x) =$ _____

    (f) $\lim\limits_{x \to -\infty} f(x) =$ _____

2. Sketch the graph of the function $f(x)$ defined below and use it to determine the values of a for which $\lim\limits_{x \to a} f(x)$ exists.

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

3. Sketch the graph of a function $f(x)$ that satisfies the following properties:

    (a) $f(1) = 0$

    (b) $f(2) = 1$

    (c) $f(3) = -2$

    (d) $\lim\limits_{x \to 2} f(x) = 0$

    (e) $\lim\limits_{x \to 3^-} f(x) = -1$

    (f) $\lim\limits_{x \to 3^+} f(x) = -2$

4. Sketch the graph of a function $f(x)$ that satisfies the following properties:

    (a) $f(-3) = f(0) = f(2) = 0$

    (b) $\lim\limits_{x \to -2^-} f(x) = \infty$

    (c) $\lim\limits_{x \to -2^+} f(x) = -\infty$

    (d) $\lim\limits_{x \to 1} f(x) = \infty$

    (e) $\lim\limits_{x \to 0^-} f(x) = 2$

    (f) $\lim\limits_{x \to 0} f(x)$ DNE

5. Does $\lim\limits_{x \to 0} \dfrac{|x|}{x}$ exist? Explain why or why not.