Limits of Piecewise Functions

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A **piecewise function** has different rules for different parts of its domain. We call these parts, the **pieces** of the piecewise function.

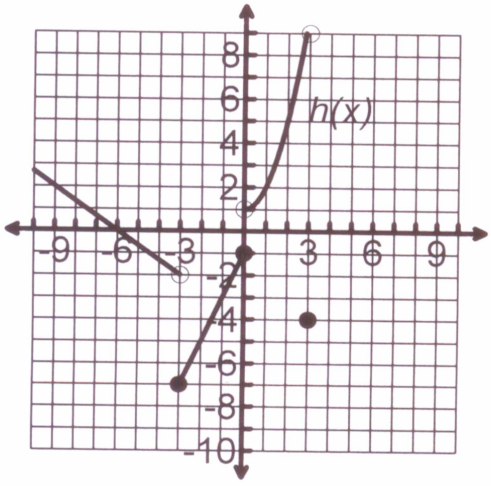
The bracket notation for a piecewise function is:

$$v(t) := \begin{cases} \dfrac{4t}{5} & -5 \le t \le -1 \\ -t^2 & -1 < t \le 3 \end{cases}$$

The limit definition applies to any piecewise function both graphically & algebraically.

**1. a) Write the piecewise function for the graph of $h(x)$ below.

$h(x) = \begin{cases} -\frac{2}{3}x - 4, & x < -3 \\ 2x - 1, & -3 \le x \le 0 \\ x^2 + 1, & 0 < x < 3 \\ -4, & 3 \end{cases}$



b) Find $\lim_{x \to -3} (h(x))$ DNE

c) Find $\lim_{x \to -\infty} (h(x))$ ∞

d) Find $h(3)$ -4

e) Find $\lim_{x \to -4} (h(x))$ $-4/3$ (don't estimate)

f) Find $\lim_{x \to 2} (h(x))$ 5

**2. If $f(x) := \begin{cases} \ln(x) & 0 < x \le 2 \\ x^2 \ln(2) & 2 < x \le 4 \end{cases}$ then $\lim_{x \to 2} f(x)$ is DNE.

$\ln(2) \neq 4\ln 2$

or $\lim_{x \to 2^-} f(x) \neq \lim_{x \to 2^+} f(x)$