AP Calculus-AB

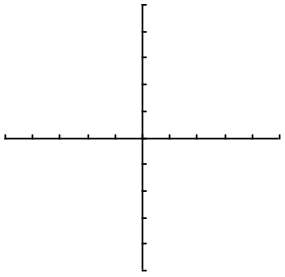
Notes: Graphs from limits — Limits, Continuity, & R.O.C. Day 7

Steps:

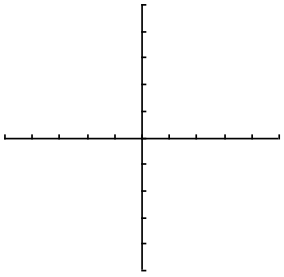
1. You always label each piece:
   - $\lim_{x\to c} f(x) = \pm\infty \Longrightarrow$ Then
   - $\lim_{x\to\pm\infty} f(x) = L \Longrightarrow$ Then
   - $\lim_{x\to c} f(x) = L \Longrightarrow$ Then
   - $f(x) = y \Longrightarrow$ Then
2. Graph VA, HA, open, and closed circles
3. Graph behavior at VA and open circles $\left(\lim_{x\to c} f(x) = L\right)$
4. Graph end behavior

Example(s) 1: Using the given limits, sketch a graph.

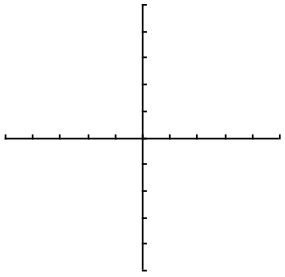
A.) $\lim_{x\to\infty} f(x) = 0$
$\lim_{x\to 4^+} f(x) = \infty$
$\lim_{x\to 4^-} f(x) = -\infty$
$\lim_{x\to-\infty} f(x) = 0$



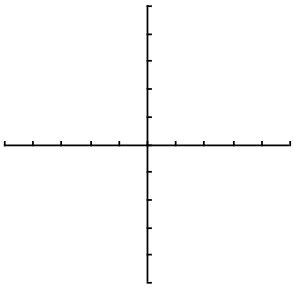
B.) $\lim_{x\to\infty} f(x) = \infty$
$\lim_{x\to 2} f(x) = 0$
$\lim_{x\to-\infty} f(x) = \infty$
$f(2) = 3$



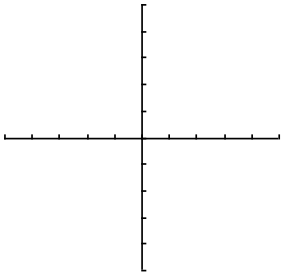
C.) $\lim_{x\to\infty} f(x) = 4$
$\lim_{x\to 0^+} f(x) = 1$
$\lim_{x\to 0^-} f(x) = 1$
$\lim_{x\to-\infty} f(x) = -2$
$f(2) = 1$



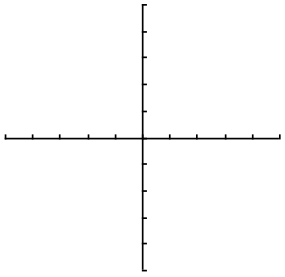
D.) $\lim_{x\to\infty} f(x) = -2$
$\lim_{x\to 0^+} f(x) = \infty$
$\lim_{x\to 0^-} f(x) = -\infty$
$\lim_{x\to\infty} f(x) = 2$



E.) $\lim_{x\to\infty} f(x) = 5$
$\lim_{x\to -2^+} f(x) = 3$
$\lim_{x\to -2^-} f(x) = -3$
$\lim_{x\to-\infty} f(x) = -5$



F.) $\lim_{x\to\infty} f(x) = 0$
$\lim_{x\to 0} f(x) = -\infty$
$\lim_{x\to-\infty} f(x) = 0$
$f(0) = 2$

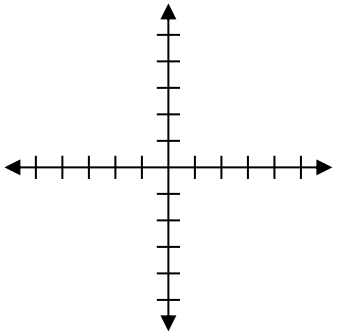


Lets practice more of these:

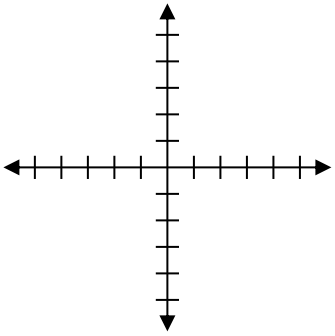
Graphs from Limits #1

Using the given limits, sketch a graph.

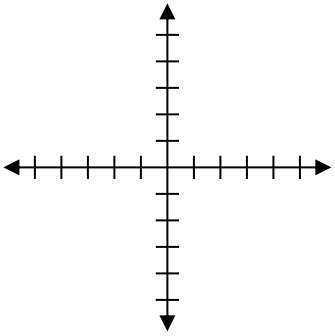
1. $\lim_{x\to\infty} f(x) = 2$
$\lim_{x\to 3^+} f(x) = \infty$
$\lim_{x\to 3^-} f(x) = -\infty$
$\lim_{x\to -\infty} f(x) = -\infty$



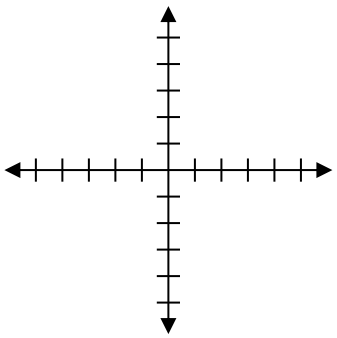
2. $\lim_{x\to\infty} f(x) = -\infty$
$\lim_{x\to -\infty} f(x) = \infty$
$\lim_{x\to 0^-} f(x) = -1$
$\lim_{x\to 0^+} f(x) = -1$



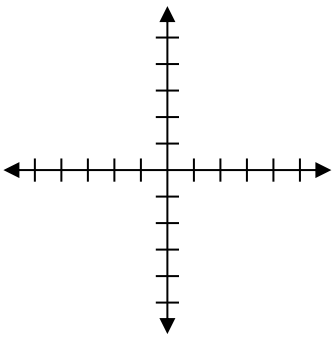
3. $\lim_{x\to\infty} f(x) = 0$
$\lim_{x\to 2^+} f(x) = \infty$
$\lim_{x\to 2^-} f(x) = -\infty$
$\lim_{x\to -\infty} f(x) = \infty$



4. $\lim_{x\to\infty} f(x) = \infty$
$\lim_{x\to 3^+} f(x) = 0$
$\lim_{x\to 3^-} f(x) = 0$
$\lim_{x\to -\infty} f(x) = \infty$
$f(3) = 2$



5. $\lim_{x\to\infty} f(x) = 2$
$\lim_{x\to 0^+} f(x) = -\infty$
$\lim_{x\to 0^-} f(x) = \infty$
$\lim_{x\to -\infty} f(x) = -\infty$



6. $\lim_{x\to\infty} f(x) = \infty$
$\lim_{x\to 0^+} f(x) = 3$
$\lim_{x\to 0^-} f(x) = -2$
$\lim_{x\to -\infty} f(x) = -\infty$