# Quick Review Sheet for A.P. Calculus

## Limits

- Definition:
  Three criteria must be met for a limit to exist:

  $\lim_{x \to a} f(x) = L$ if

  (1) $\lim_{x \to a+} f(x)$ exists

  (2) $\lim_{x \to a-} f(x)$ exists

  (3) $\lim_{x \to a+} f(x) = \lim_{x \to a-} f(x) = L$

- Steps in Evaluating Limits:

  (1) Substitute, Factor, and Simplify

  If you get $\frac{0}{0}$, then you must DO MORE.

  If you get $\frac{0}{k}$, then the limit is 0.

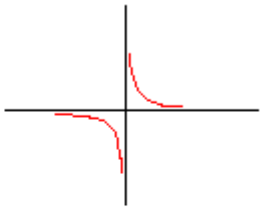
  If you get $\frac{k}{0}$, then the limit is either $+\infty$, $-\infty$, or DNE.

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

(3) $\lim_{x \to 0^-} \frac{1}{x} = -\infty$

(4) $\lim_{x \to -\infty} \frac{1}{x} = 0$

(5) $\lim_{x \to +\infty} \frac{1}{x} = 0$



- Limits as x approaches infinity

  If taking the limit of a Rational expression, Divide by the highest power of x.

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- L'Hopital's Rule

  If $\lim_{x\to a}\frac{f(x)}{g(x)}=\frac{0}{0}$ or $\lim_{x\to a}\frac{f(x)}{g(x)}=\frac{\infty}{\infty}$

  Then $\lim_{x\to a}\frac{f(x)}{g(x)}=\lim_{x\to a}\frac{f'(x)}{g'(x)}$

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- Trig Limits

  $\lim_{h\to 0}\frac{\sin(h)}{h}=1$

## Continuity

- **Definition**

  Definition of Continuity at a Point:

  A function f is continuous at a point $c$ if:

  (1) $f(c)$ is defined

  (2) $\lim_{x\to c} f(x)$ exists

  (3) $\lim_{x\to c} f(x) = f(c)$