Summary of Limits, Continuity, and Differentiability

	Limits	**Continuity**	**Differentiability**
Conceptually	Where is the function headed (y-value) as you get near a certain x-value?	Can you draw it without picking up your pencil?	Is it smooth?
Graphically	No jumps or infinite squiggles, ignore the point itself	No holes, breaks, or infinite squiggles	No corners, breaks, or infinite squiggles
Algebraically	1) Limits from both sides have to agree	1) Limits from both sides have to agree 2) The y-value of the point has to agree with the limit	1) Limits from both sides have to agree 2) The y-value of the point has to agree with the limit 3) Limit of the difference quotient must also exist.
Math Notation * And fine print	1) $\lim_{x\to a^+} f(x) = \lim_{x\to a^-} f(x)$ *f(x) is defined on an interval on both sides of a	1) $\lim_{x\to a^+} f(x) = \lim_{x\to a^-} f(x)$ 2) $f(a)$ is defined and $f(a) = \lim_{x\to a} f(x)$	1) $\lim_{x\to a^+} f(x) = \lim_{x\to a^-} f(x)$ 2) $f(a)$ is defined and $f(a) = \lim_{x\to a} f(x)$ 3) $\lim_{h\to 0^+} \frac{f(x+h)-f(x)}{h} = \lim_{h\to 0^-} \frac{f(x+h)-f(x)}{h}$