2/2 & 2/3

MAT 122

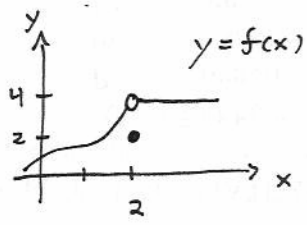
The limit of $f(x)$ as x approaches a, $\lim_{x \to a} f(x)$ is the number that $f(x)$ approaches as x approaches a.

More precisely,

$\lim_{x \to a} f(x) = L$ means that no matter how close we desire $f(x)$ to be to L, ~~we can make~~ $f(x)$ will be that close when x is sufficiently close to a.

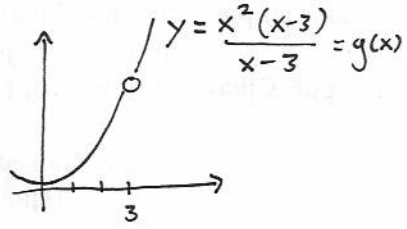
Example! $\lim_{x \to 1} \frac{\ln(x)}{x-1} = 1$ as is suggested from the table.

~~The Method~~



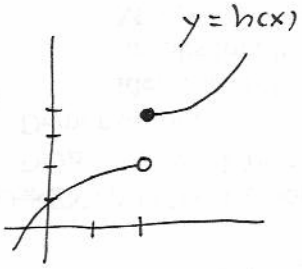
$\lim_{x \to 2} f(x) = 4$

$f(2) = 2$



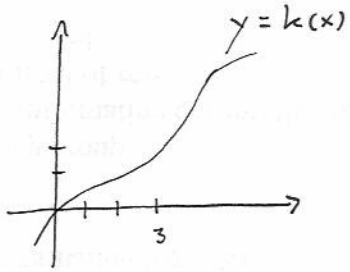
$\lim_{x \to 3} \frac{x^2(x-3)}{x-3} = 9$

$g(3)$ undefined



$\lim_{x \to 2} h(x)$ ≠ DNE

$h(2) = 4$



$\lim_{x \to 3} k(x) = 2$

$k(3) = 2$

 2/3

☆ The limit exists precisely when the limit from the right ~~agrees with~~ equals the limit from the left.

$\lim_{x \to 2^-} h(x) = 2$ $\lim_{x \to 2^+} h(x) = 4$

Example: ~~Practice~~

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

Therefore $\lim_{x \to 0} f(x)$ does not exist.