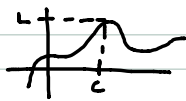


Limits  $\rightarrow$  LIM

12-1-14

Limits are a way of Making a Prediction

$\lim_{x \rightarrow L} f(x) = L$



$\lim_{x \rightarrow 2} x^2 =$   
Plug 2 into x!



$x^2 =$  Parabola

$\lim_{x \rightarrow \infty} \left(\frac{5}{x}\right) = 0$

Use the PEM  
Plug in Method

X	Y
1	5
10	.5
100	.05
1000	.005
1,000,000	.000005

$f(x) = \frac{x^2 - x - 6}{x + 2}$   $x = -2$

$f(x) = \frac{(-2)^2 - (-2) - 6}{-2 + 2} = \frac{4 + 2 - 6}{0} = \frac{0}{0}$

$\lim_{x \rightarrow -2} \frac{x^2 - x - 6}{x + 2} = \boxed{-5}$

Famous Indeterminate Forms:

$\frac{0}{0} = ?$   $\frac{\infty}{\infty} = ?$

$\infty \cdot 0 = ?$   $\infty^0 = ?$

x	Y
1	-2
0	-3
-1	-4
-1.5	-4.5
-1.9	-4.9
-1.99	-4.99

$\lim_{x \rightarrow \infty} (1 + 1/x)^x = 1^\infty = ?$

x	Y
1	2
10	2.593272
1000	2.716923933
1,000,000	2.718280469

$\lim_{x \rightarrow 5} \frac{5x+2}{3x-4} = \frac{5(5)+2}{3(5)-4} = \frac{25+2}{11} = \frac{27}{11} = \boxed{2.45}$

X	Y
3	3.4
4	$2.75 = 22/8$
4.5	2.57

$\frac{5(4.5)+2}{3(4.5)-2} = \frac{22.5+2}{13.5-2}$

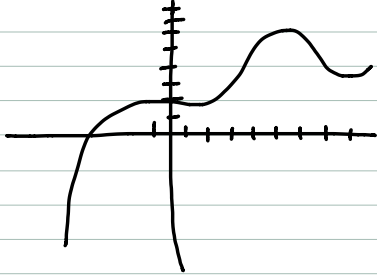
$\lim_{x \rightarrow 2} \frac{x^3 - 2x^2}{3x - 6} = \frac{2^3 - 2(2)^2}{3(2) - 6} = \frac{-4}{6-6} = \frac{-4}{0}$   $\leftarrow$  undefined?

$x \rightarrow 2$

x	Y
1	.333
1.9	1.023
1.99	1.32003
1.999	1.3332

$\lim_{x \rightarrow \infty} \sin(x) =$

- Approach from Left  
+ Approach from Right



$$\lim_{x \rightarrow 0^-} f(x) = 2 \quad \lim_{x \rightarrow 7^+} f(x) = 7$$

$$\lim_{x \rightarrow 7^-} f(x) = 4$$

$$\lim_{x \rightarrow 0^+} f(x) = 2 \quad \lim_{x \rightarrow 7} f(x) = \text{DNE}$$

$$\lim_{x \rightarrow 7} f(x) = 2$$

$$x = 0$$

$$\lim_{x \rightarrow \infty} f(x) = 7 \quad \lim_{x \rightarrow \infty^-} f(x) =$$

$$x \rightarrow \infty$$