Math 1210-2
Monday Sept 10

* The 3 trig identities you must know:
  (1)
  (2)
  (3)

We will want to find derivatives of scientific functions soon, and to get ready we will investigate limits more closely. Here are some examples - see section 1.1 for elaboration.

$\lim_{x \to c} f(x) = L$ "The limit as x approaches c of f(x) equals L"
means, roughly speaking, that when x is "near" c (but $\neq c$), f(x) is near L.

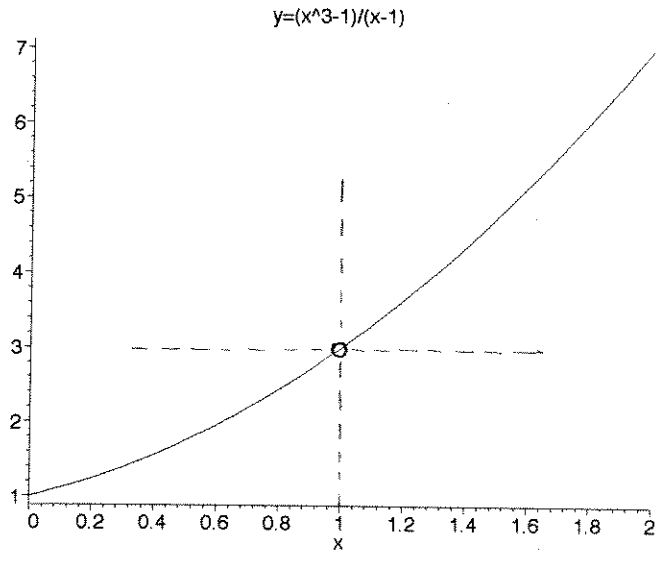
example

$\lim_{x \to 1} \frac{x^3-1}{x-1} \stackrel{?}{=} \square$

table (to fill in)

x	f(x)
2	
0	
1.1	
.9	
1.01	
.99	

graph of $y = \frac{x^3-1}{x-1}$



can you justify our answer algebraically?
hint: do long division.

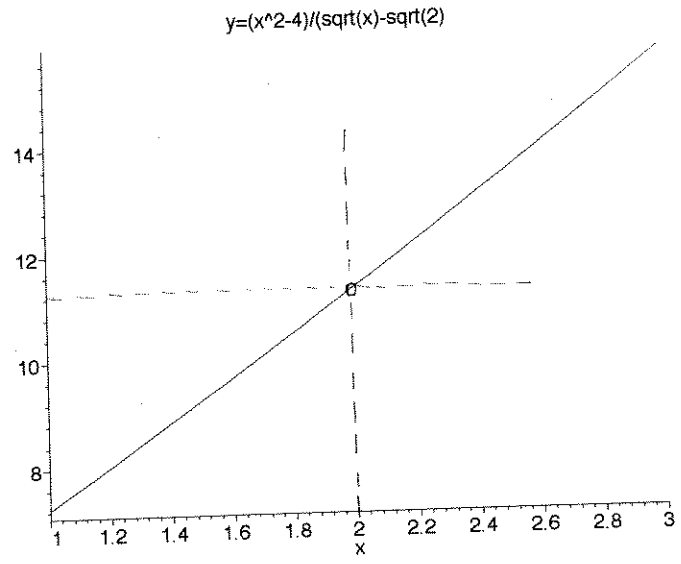
example 2

$$f(x) = \frac{x^2-4}{\sqrt{x}-\sqrt{2}}$$

find $\lim_{x\to 2} f(x) =$ [ ]

x	f(x)
1	
2	
1.5	
1.9	
1.99	

use algebra!

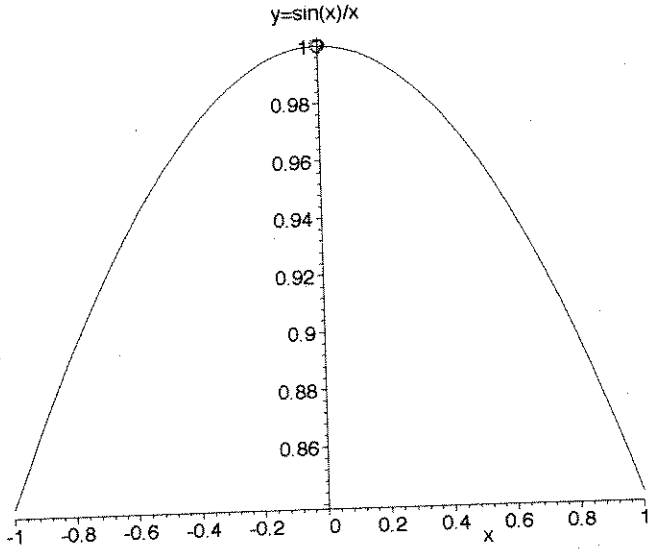


example 3

$$\lim_{x\to 0} \frac{\sin x}{x}$$

x in radians!

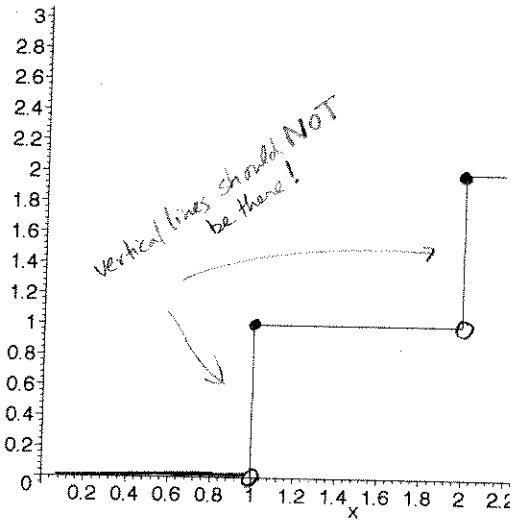
x	f(x)
.1	
-.1	
.01	
-.01	
.001	



can you justify this guess algebraically?

example 4

$\lim_{x \to 1} [\![x]\!] \stackrel{?}{=}$ ☐



but

$\lim_{x \to 1^-} [\![x]\!] = 0$

$\lim_{x \to 1^+} [\![x]\!] = 1$

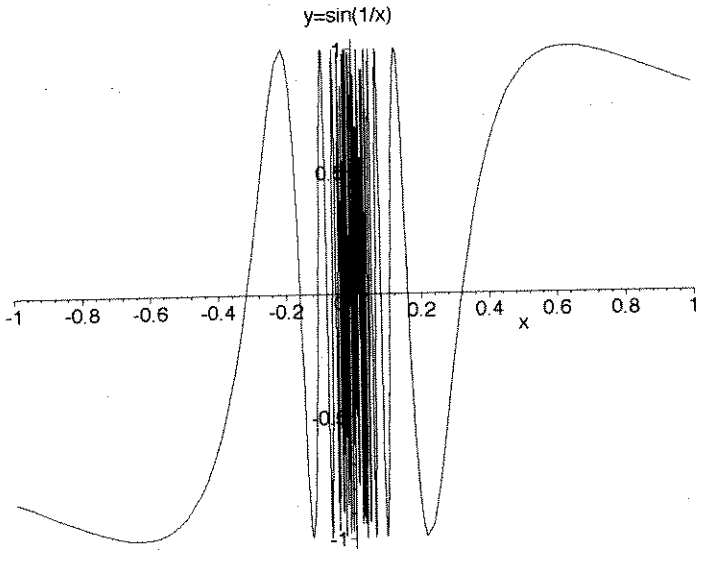
$\lim_{x \to c^-} f(x) = L$ means that as x approaches c from the left ($x < c$), $f(x)$ gets closer to L

$\lim_{x \to c^+} f(x) = L$ is analogous, except x approaches c from the positive (right) dir.

example 5

$\lim_{x \to 0} \sin \frac{1}{x} \stackrel{?}{=}$ ☐

x	f(x)
$1/\pi$	
$1/2\pi$	
$1/100\pi$	
$1/\pi/2$	
$1/2001\pi/2$	
.1	
.01	



example 6

$\lim_{x \to 0} 2x \sin \frac{1}{x} \stackrel{?}{=}$ ☐