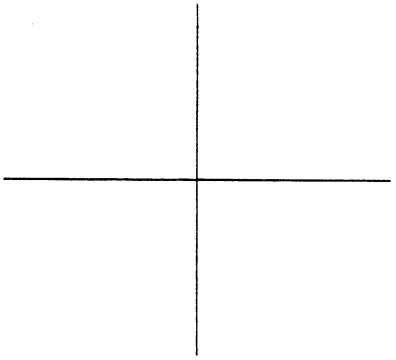
CALCULUS
LAB ON LIMITS

Work the following with a partner.

1. Consider the function $f(x)=\dfrac{x^4-1}{x-1}$.

   a) Use the TABLE on your graphing calculator to fill in the table below.

x	$f(x)$	x	
1.9		2.1	
1.99		2.01	
1.999		2.001	
2			



   b) What is $\lim\limits_{x\to 2}\dfrac{x^4-1}{x-1}$? _____

   c) What is $f(2)$? _____

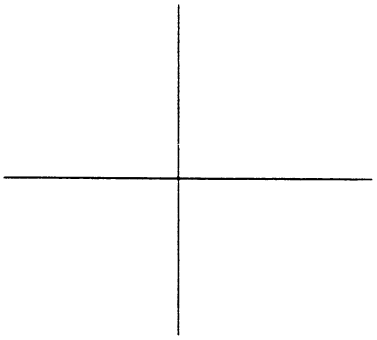
   d) Graph $f(x)$ on your graphing calculator, using a friendly window for x and $[-20, 20]$ for y. What happens at $x=2$? _____

   e) Sketch the graph.

2. Use the same function f as above, but this time look at what happens as x approaches 1.

   a) Use the TABLE on your calculator to fill in the table below.

x	$f(x)$	x	$f(x)$
0.9		1.1	
0.99		1.01	
0.999		1.001	
1			



   b) What is $\lim\limits_{x\to 1}\dfrac{x^4-1}{x-1}$? _____

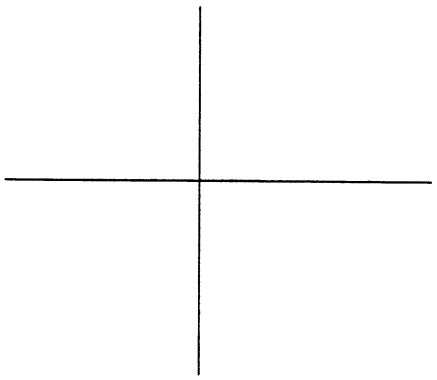
   c) What is $f(1)$? _____

   d) Graph $f(x)$ on your graphing calculator using the same window as above. What happens at $x=1$? _____

   e) Sketch the graph.

3. a) Make a table to help you find $\lim_{x\to 0}\frac{\sin(100x)}{x}$.

x	$f(x)$



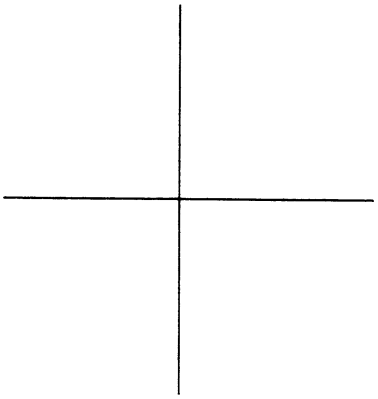
b) Graph the problem in the window $[-0.2, 0.2]$ x $[-40, 120]$.
What happens at $x = 0$? _____

c) Sketch the graph.

d) What is $\lim_{x\to 0}\frac{\sin(100x)}{x}$? _____

4. a) Make a table to help you find $\lim_{x\to 0}(1+x)^{1/x}$.

x	$f(x)$



b) Graph the problem in the window $[-2, 2]$ x $[-5, 10]$.
What happens at $x = 0$? _____

c) Sketch the graph.

d) What is $\lim_{x\to 0}(1+x)^{1/x}$? _____