

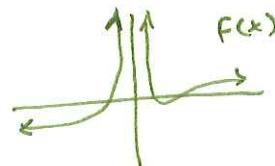
Worksheet 2.2.

Limits: A Numerical and Graphical Approach

1. Use your graphing calculator to graph $f(x) = \frac{\cos x}{x^2}$. Make a guess as to the value of $\lim_{x \rightarrow 0} \frac{\cos x}{x^2}$. Construct a table of values for $f(-.1)$, $f(-.01)$, $f(-.001)$, $f(-.0001)$, $f(.1)$, $f(.01)$, $f(.001)$, $f(.0001)$. Estimate $\lim_{x \rightarrow 0} \frac{\cos x}{x^2}$.

x	$-.1$	$-.01$	$-.001$	$-.0001$	0	$.0001$	$.001$	$.01$	$.1$
$f(x)$	99.5	9999.5	999999.5	99999999.5		99999999.5	999999.5	9999.5	99.5

$$\lim_{x \rightarrow 0} \frac{\cos x}{x^2} = \infty$$



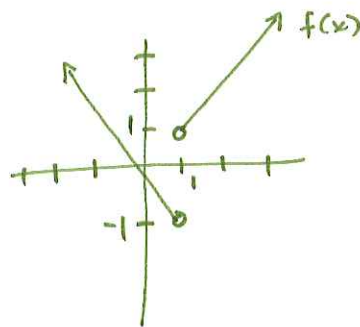
2. Graph $f(x) = x \frac{|x-1|}{x-1}$. What is the $\lim_{x \rightarrow 1^+} f(x)$ and $\lim_{x \rightarrow 1^-} f(x)$? Construct a table of values for $f(.9)$, $f(.99)$, $f(.999)$, $f(1.001)$, $f(1.01)$, $f(1.1)$. What is the $\lim_{x \rightarrow 1^+} f(x)$ and $\lim_{x \rightarrow 1^-} f(x)$?

x	$.9$	$.99$	$.999$	1	1.001	1.01	1.1
$f(x)$	$-.9$	$-.99$	$-.999$		1.001	1.01	1.1

→ from left
← from right

$$\lim_{x \rightarrow 1^-} f(x) = -1$$

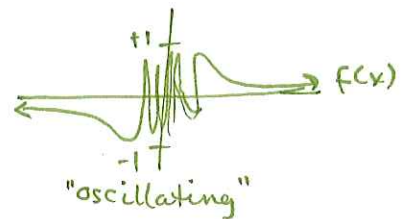
$$\lim_{x \rightarrow 1^+} f(x) = 1$$



3. Using a graphing calculator, graph $f(x) = \sin \frac{1}{x}$. Does it look as if $\lim_{x \rightarrow 0} f(x)$ exists? Construct a table of values for $f(-.1)$, $f(-.01)$, $f(-.001)$, $f(-.0001)$, $f(.1)$, $f(.01)$, $f(.001)$, $f(.0001)$. What do you conclude about $\lim_{x \rightarrow 0} f(x)$?

x	-.1	-.01	-.001	-.0001	0	.0001	.001	.01	.1
f(x)	.544	.506	-.827	.306		-.306	.827	-.506	-.544

$$\lim_{x \rightarrow 0} f(x) = \text{DNE}$$



4. Using a graphing calculator, graph $f(x) = \frac{\sin x}{x}$. Make a guess as to the $\lim_{x \rightarrow 0} f(x)$. Construct a table of values for $f(-.1)$, $f(-.01)$, $f(-.001)$, $f(-.0001)$, $f(.1)$, $f(.01)$, $f(.001)$, $f(.0001)$. Estimate $\lim_{x \rightarrow 0} f(x)$.

x	-.1	-.01	-.001	-.0001	0	.0001	.001	.01	.1
f(x)	.998	.999	.999	.999		.999	.999	.999	.998

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

