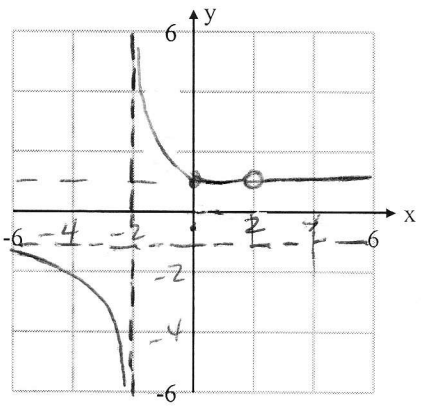
1.7.1.8B, 2

3. Find each of these limits. Use the limits to sketch a graph. Be sure to include any asymptotes, holes, or other important characteristics.

$f(x)=\dfrac{x-2}{|x|-2}$

$f(x)=\begin{cases}\dfrac{x-1}{x+2} & x\geq 0\\ \dfrac{x-1}{-x-2} & x<0\end{cases}$



$\lim_{x\to-\infty} f(x)=-1$ $\quad \lim_{x\to\infty} f(x)=1$

$\lim_{x\to-2^-} f(x)=-\infty$ $\quad \lim_{x\to-2^+} f(x)=\infty$

$\lim_{x\to 2} f(x)=1$

4. Find the value of k that would make the function continuous in each case.

A. $g(x)=\begin{cases}\dfrac{e^x-1}{x} & x\neq 0\\ k & x=0\end{cases}$

$\frac{e^x-1}{k}$ is undefined at $x=0$

look at $\lim_{x\to 0} g(x)$

$k=1$

left x	$g(x)$	x	$g(x)$ right
-0.1	0.951626	0.1	1.051709
-0.01	0.995017	0.01	1.0050167
-0.001	0.999500	0.001	1.00050017
-0.0001	0.99995	0.0001	1.000050
-0.00001	0.999995	0.00001	1.000005

B. $h(x)=\begin{cases}\dfrac{\sin(5\pi x)-1}{2x-1} & x\neq\frac{1}{2}\\ k & x=\frac{1}{2}\end{cases}$

must be in radian mode

x	$h(x)$
.4	
.49	0.615583
.499	0.0616838
.4999	0.00616685
.49999	0.000616685

x	$h(x)$
0.51	-0.615582997
0.501	-0.0616838
0.5001	-0.0061685
0.50001	-0.000616685
0.500001	-0.00006185

$k=0$

5. Find the value of k that would make the limit exist. Find the limit.

A. $\lim_{x\to\infty}\dfrac{2x^3-6}{x^k+3}$

end behavior

what would k have be so that the rational function has a horizontal asymptote

$k\geq 3$

if $k=3$ $\lim_{x\to\infty}\frac{2x^3-6}{x^3+3}=2$

if $k>3$ $\lim_{x\to\infty}\frac{2x^3-6}{x^k+3}=0$

B. $\lim_{x\to 2}\dfrac{x^2+kx-10}{x-2}$

If the rational function has a vertical asymptote at $x=2$ then the limit does not exist.

What would make it not have a vertical asymptote?

If it has a hole at $x=2$ the limit exists

$\frac{(x-2)(x+5)}{x-2}=x+5$ so $k=3$

$\frac{x^2+3x-10}{x-2}$