2.2 Limits: A Numerical and Graphical Approach

1. Investigate $\lim_{x \to 1} f(x)$ where $f(x) = \frac{x^3-1}{x-1}$ $x \neq 1$ numerically and graphically.

Numerically:

$x \to 1-$ From the left	$\frac{x^3-1}{x-1}$	$x \to 1+$ From the right	$\frac{x^3-1}{x-1}$
0.8		1.1	
.99		1.01	
.999		1.001	

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

Graphically:

Graph the function on a graphing calculator. Use the trace function to determine the limit.

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

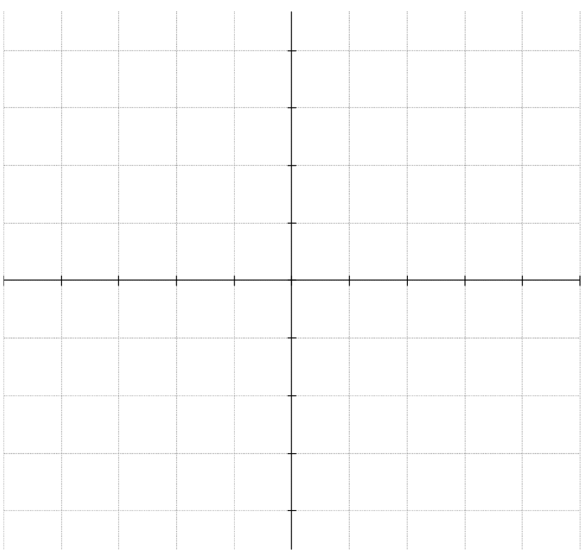
Definition of a limit:

$$\lim_{x \to a} f(x) = L$$

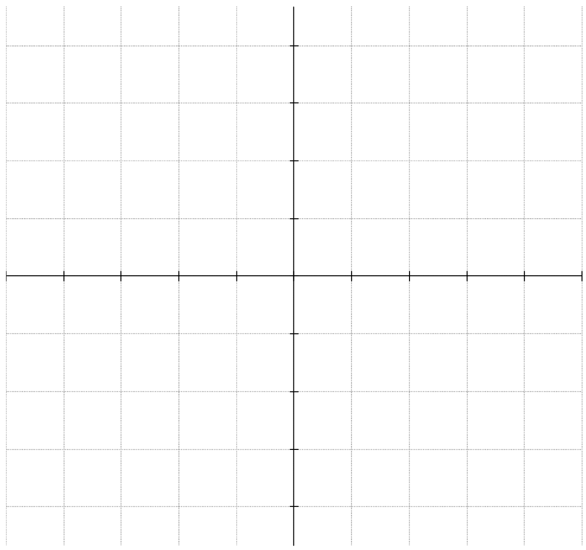
The limit of $f(x)$ as *x* approaches *a* is equal to *L*

2. Find the limit numerically $\lim_{x \to 0} \frac{x}{\sqrt{x+1}-1}$

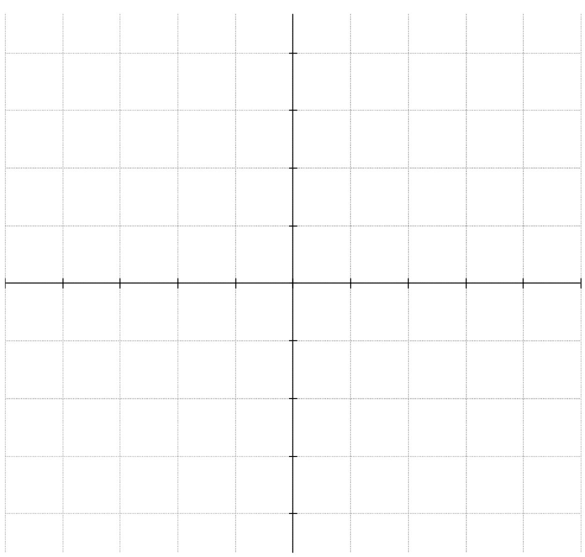
3. Determine $\lim_{x \to 2} f(x)$ graphically given that $f(x) = \begin{cases} 1 & x \neq 2 \\ 0 & x = 2 \end{cases}$



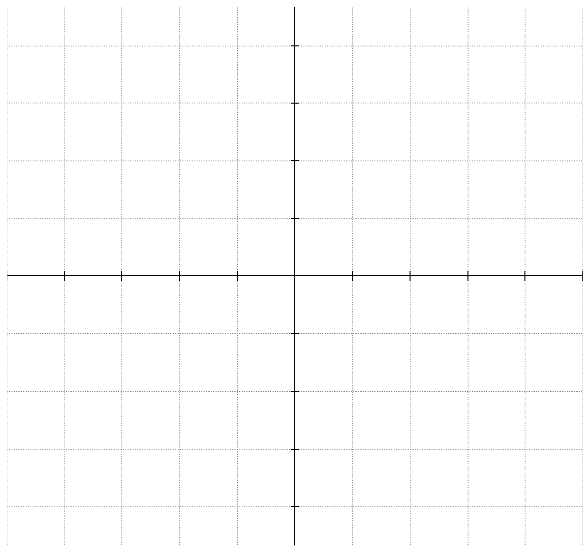
4. Determine $\lim_{x \to 0} f(x)$ graphically given that $f(x) = \frac{|x|}{x}$



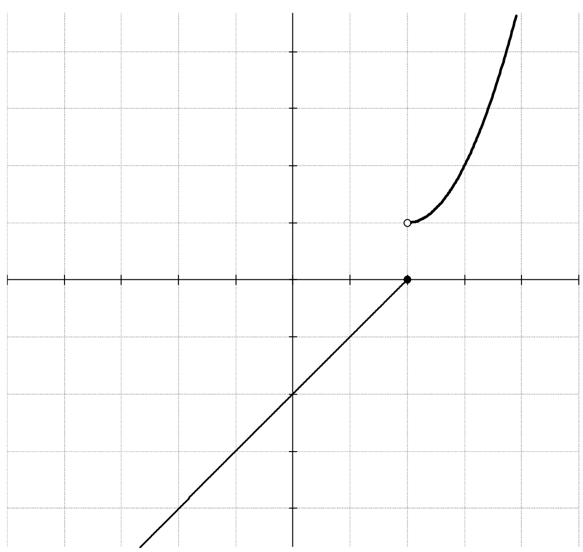
5. Determine $\lim_{x \to 0} f(x)$ graphically given that $f(x) = \frac{1}{x^2}$



6. Determine $\lim_{x \to 3} f(x)$ graphically given that $f(x) = \frac{1}{x-3}$



7. Determine the limits.



a) $\lim_{x \to 0} f(x)$

b) $\lim_{x \to 3} f(x)$

c) $\lim_{x \to 2-} f(x)$

d) $\lim_{x \to 2+} f(x)$

e) $\lim_{x \to 2} f(x)$