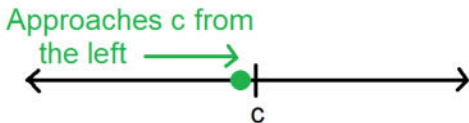
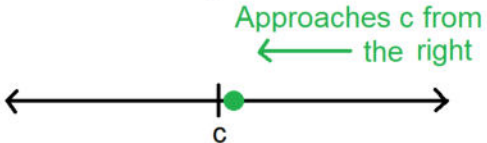


Introduction to Limits, Continuity, and Infinity (1)

Definition: We write  $\lim_{x \rightarrow c} f(x) = L$  when both of the following conditions hold true:

1.  $\lim_{x \rightarrow c^-} f(x) = L$  
2.  $\lim_{x \rightarrow c^+} f(x) = L$ . 

We say  $f(x)$  is **continuous** at  $a$  strictly when all of the following hold true:

1.  $f(a) = L$
2.  $\lim_{x \rightarrow a^-} f(x) = L$
3.  $\lim_{x \rightarrow a^+} f(x) = L$ .

1. What does  $\lim_{x \rightarrow 0^+} \frac{1}{x}$  equal?

2. What does  $\lim_{x \rightarrow 0^-} \frac{1}{x}$  equal?

3. What does  $\lim_{x \rightarrow 3^-} \frac{1}{x-3}$  equal?

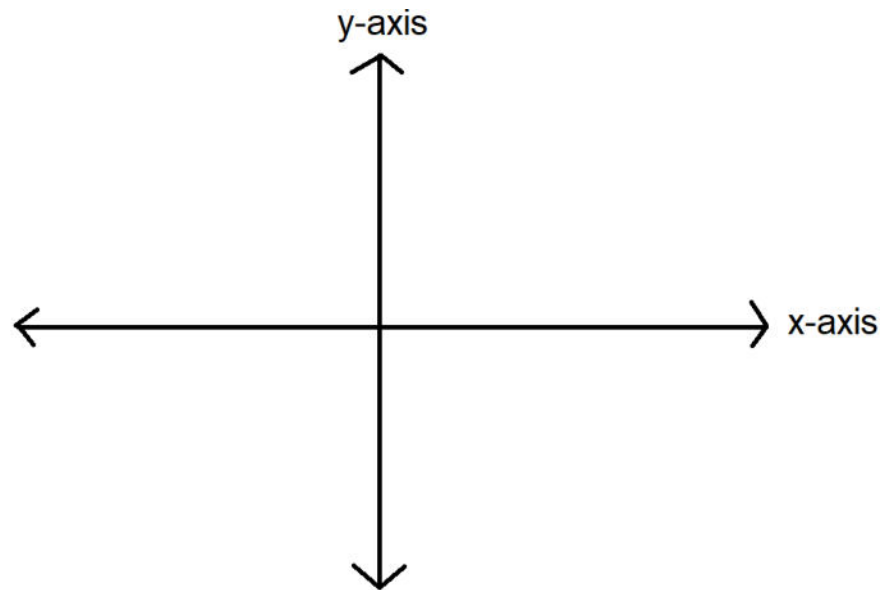
4. What does  $\lim_{x \rightarrow 3^+} \frac{1}{x-3}$  equal?

5. What does  $\lim_{x \rightarrow -6} x^2 + 5$  equal?

6. Let  $f(x) = \frac{x-3}{x-3}$ .

a.) What is the domain of  $f(x)$ ?

b.) Graph  $f(x)$  below. (Use a calculator.)



c. What does  $\lim_{x \rightarrow 3^-} f(x)$  equal?

d. What does  $\lim_{x \rightarrow 3^+} f(x)$  equal?

e. What does  $\lim_{x \rightarrow 3} f(x)$  equal?

f. Is  $f(x)$  continuous at 3? Explain.

g. We say a function has **removable discontinuity** when we remove a point from a continuous function which made it discontinuous. Does  $f(x)$  have a removable discontinuity? (Explain.)