

# Calculus BC

## Section 1.5 - Infinite Limits

- Obj: - Find and sketch the vertical asymptotes of the graph of a function.  
- Determine infinite limits from the left and from the right

1. Given  $f(x) = \frac{1}{x-2}$

a) find the vertical asymptote

b) find the left and right limit at the vertical asymptote.

2. Given  $f(x) = \frac{1}{(x-2)^2}$

a) find the vertical asymptote

b) find the left and right limit at the vertical asymptote.

What do you notice about the limits at the asymptote  $x = c$ ?

## Definition of Vertical Asymptote:

If  $f(x)$  approaches  $\pm\infty$  as  $x$  approaches  $c$  from the right or the left, then the line  $x = c$  is a vertical asymptote of the graph of  $f$

3. a) Determine all vertical asymptotes of  $f(x) = \frac{x^3 + 27}{x^2 - 9}$

-factor

-determine the domain

-reduce

-find vertical asymptote

b) Find  $\lim_{x \rightarrow 3^+} f(x)$  and  $\lim_{x \rightarrow 3^-} f(x)$

4. Find

a)  $\lim_{x \rightarrow 1^+} \frac{x^2 - 3x}{x - 1}$

since the vertical asymptote is \_\_\_\_\_,  
the limit at  $x = \underline{\quad}$  must either be \_\_\_\_\_ or \_\_\_\_\_

Examine  $x$  values near  $1^+$

b)  $\lim_{x \rightarrow 1^-} \frac{x^2 - 3x}{x - 1}$