# Today's Plan:

*Learning Target (standard)*:  I will evaluate and describe one-sided limits.  I will analyze asymptotic behavior.

*Students will*:  Complete practice problems over previous concepts at the boards, put up homework problems on the board and make neccessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

*Teacher will*:  Provide practice problems over previous concepts, check homework problems for accuarcy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

*Assessment*:  Board work, homework check and homework assignment

*Differentiation*:  Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.
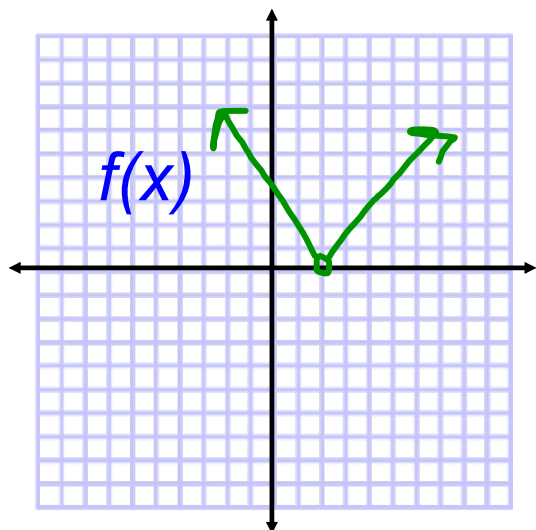
# One-Sided Limits:
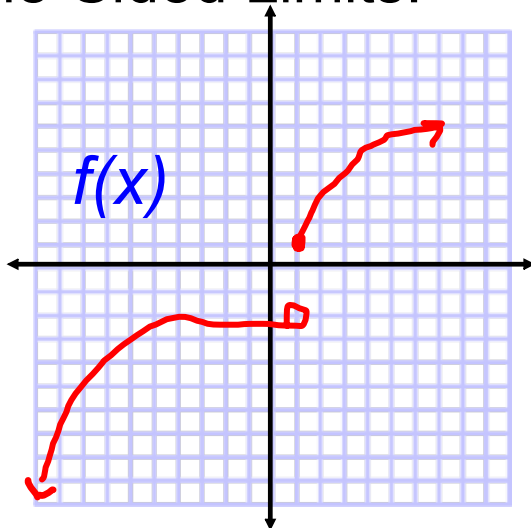


$$\lim_{x \to 1} f(x) = \text{DNE}$$

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

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

## One-Sided Limits:

$f(x)$

$$\lim_{x \to 2} f(x) = 0$$

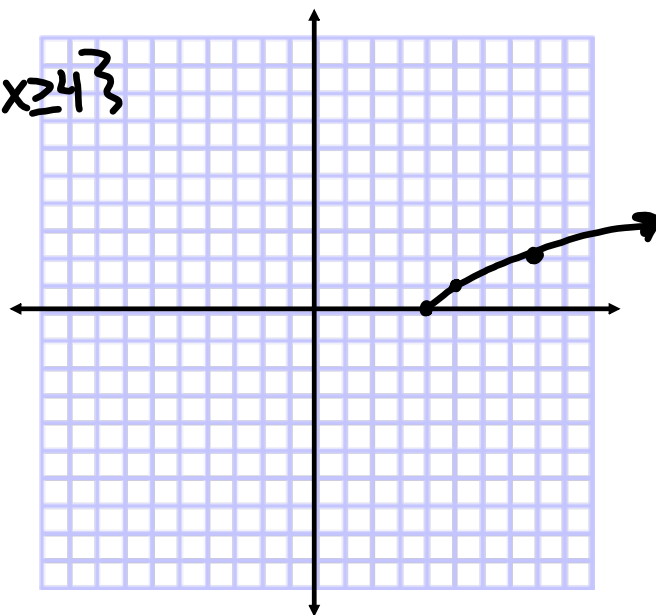$$\lim_{x \to 2^-} f(x) = 0$$

$$\lim_{x \to 2^+} f(x) = 0$$

Graph and evaluate the limits:

$$f(x) = \sqrt{x - 4} \quad D: \{x | x \geq 4\}$$

a) $\lim_{x \to 4^-} f(x) = DNE$

b) $\lim_{x \to 4^+} f(x) = 0$

c) $\lim_{x \to 4} f(x) = DNE$

Graph and evaluate the limits:

$$f(x) = 1 + \sqrt{x+1}$$

$D: \{x \mid x \geq -1\}$

a) $\displaystyle\lim_{x \to -1^-} f(x) = $ DNE

b) $\displaystyle\lim_{x \to -1^+} f(x) = 1$

c) $\displaystyle\lim_{x \to -1} f(x) = $ DNE
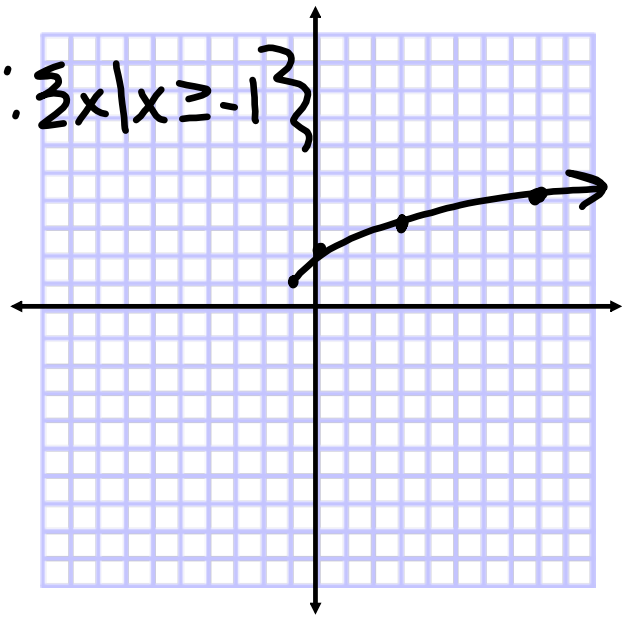
Evaluate the limit:

$$\lim_{x \to 2^+}\left(1 + \sqrt{x-2}\right) = 1$$

$D: \{x \mid x \geq 2\}$

$$\lim_{x \to 2^-}\left(1 + \sqrt{x-2}\right) = \text{DNE}$$

$$\lim_{x \to 2}\left(1 + \sqrt{x-2}\right) = \text{DNE}$$

Evaluate the limit:

$$D : \{ x \mid x \le \tfrac{5}{2} \}$$

$$\lim_{x \to \frac{5}{2}^+} \left( \sqrt{5 - 2x} - x^2 \right) = \text{DNE}$$

$$5 - 2x \ge 0$$
$$-2x \ge -5$$
$$x \le \tfrac{5}{2}$$

$$\lim_{x \to \frac{5}{2}^-} \left( \sqrt{5 - 2x} - x^2 \right) = -\frac{25}{4}$$

$$\lim_{x \to \frac{5}{2}} \left( \sqrt{5 - 2x} - x^2 \right) = \text{DNE}$$

Evaluate:

$$\lim_{x \to 0^-} \left( 6 + \sqrt{x} \right) = \text{DNE}$$

$$\lim_{x \to 0^+} \left( 6 + \sqrt{x} \right) = 6$$

$$\lim_{x \to 0} \left( 6 + \sqrt{x} \right) = \text{DNE}$$

\* Explain the general limit.

The limit of f(x) as x approaches 0 does not exist.  The left-hand limit as x approaches 0 does not exist and the right-hand limit as x approaches 0 is 6.  In order for the general limit to exist, the left-hand limit and the right-hand limit must be equal.  Since the left-hand and right-hand limits as x approaches 0 are not equal, the general limit as x approaches 0 does not exist.

Horizontal & Oblique Asymptotes:   "End Behavior"

1) HA: $y = 0$

- if the degree of the top is smaller than the degree of the bottom

2) HA: $y = \#$

- if the two degrees are equal

3) OA: $y = mx+b$

- if the degree of the top is 1 bigger than the degree of the bottom

              - long division

4) Other end behavior

- if the degree of the top is more than 1 bigger than the degree of the bottom

            - long division

# Assignment:

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*Graph 17 & 18*