11.3 More on Limits
Target 9A: Evaluate a limit of a function algebraically
Target 9D: Calculate one-sided limits and two-sided limits

Review of Prior Concepts

1. $\lim\limits_{x \to \infty} \left(\dfrac{x^2 - 4}{x+2} \right)$

2. $\lim\limits_{x \to -\infty} \left(\dfrac{x^2 - 4}{x+2} \right)$

3. $\lim\limits_{x \to 2} \left(\dfrac{x^2 - 4}{x+2} \right)$

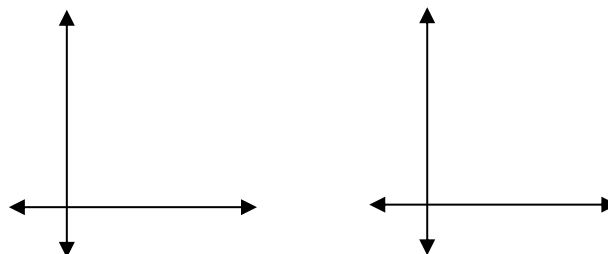### More Practice

Limits at Infinity
https://www.mathsisfun.com/calculus/limits-infinity.html
https://www.khanacademy.org/math/ap-calculus-ab/infinite-limits-ab/limits-at-infinity-ab/v/limits-and-infinity
http://www.shmoop.com/precalculus-limits/limits-infinity.html
https://youtu.be/wBYr-58mc5E
https://youtu.be/75xO9xy7TTQ
https://youtu.be/FVJNuukADeQ

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3 Methods for Evaluating Limits

①

②

③

What does $\lim\limits_{x \to c} f(x) = L$ mean?

As x approaches (but doesn't reach) c from either side, then $f(x)$ becomes arbitrarily close to L.

- Replace the value of c for x (if possible)

Examples:

1. Find: $\lim\limits_{x \to 2}(x^3 - 2x)$

2. Find: $\lim\limits_{x \to 1} 4x$

3. Find: $\lim\limits_{x \to a}(x^3 + 4x)$

4. Find: $\lim\limits_{x \to -1} \dfrac{x^2 - 1}{x - 1}$

5. Find: $\lim\limits_{x \to 1} \dfrac{x^2 - 1}{x - 1}$

6. Find: $\lim\limits_{x \to 3} \dfrac{x^2 + 2x - 15}{x^2 - 9}$

7. Find: $\lim\limits_{x \to 5} \sqrt{16 - x^2}$

8. Find: $\lim\limits_{x \to 1} \dfrac{\sqrt{x + 3} - 2}{x - 1}$

⊞ Find: **a)** $\lim\limits_{x\to0} \dfrac{\sin x}{x}$ **b)** $\lim\limits_{x\to0} \dfrac{\sin 2x}{2x}$ **c)** $\lim\limits_{x\to0} \dfrac{\sin 10x}{10x}$

$$\lim\limits_{x\to0} \frac{\sin ax}{ax} = \qquad \text{, where } a \text{ is a constant (\#)}$$

Examples:

1. $\lim\limits_{x\to0} \dfrac{\sin 4x}{x}$

2. $\lim\limits_{x\to0} \dfrac{\sin 3x}{2x}$

3. $\lim\limits_{x\to0} \dfrac{3x + \sin x}{x}$

4. $\lim\limits_{x\to0} \dfrac{\sin^2 x}{x^3 - 2x^2}$

Homework Assignment
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