Section 2.4 : One-Sided Limits

Chapter 2 : Limits and Continuity

Math 1551, Differential Calculus

Section 2.4 One-Sided Limits

Topics

We will cover these topics in this section.

1. One-sided limits of Functions
2. Limits involving $\dfrac{\sin\theta}{\theta}$ and $\dfrac{\cos\theta - 1}{\theta}$

Learning Objectives

For the topics in this section, students are expected to be able to:

1. Determine whether limits and one-sided limits exist, where they exist, and if they do, evaluate them.
2. Evaluate limits using identities involving $\dfrac{\sin\theta}{\theta}$ and $\dfrac{\cos\theta - 1}{\theta}$.

For a Limit to Exist

In order for the limit of $f(x)$ as $x \to a$ to **exist**, we need:

Example 1

Evaluate the limit.

$$\lim_{x \to 1^-} (x+5) \frac{|x-1|}{x-1}$$

Limits Involving $\dfrac{\sin\theta}{\theta}$ and $\dfrac{\cos\theta - 1}{\theta}$

It can be shown that

$$\lim_{\theta\to 0}\frac{\sin\theta}{\theta} = \qquad , \qquad \lim_{\theta\to 0}\frac{\cos\theta - 1}{\theta} =$$

Example 2: compute the limit

$$\lim_{x\to 0}\frac{\sin x}{\sin 2x}$$