Math 1431

Section 16679

Bekki George: rageorge@central.uh.edu

University of Houston

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Office Hours: Tuesdays & Thursdays 11:45-12:45
(also available by appointment)
Office: 218C PGH

Course webpage: www.casa.uh.edu

Questions

4. $\dfrac{4}{x+1} - \dfrac{3}{x+2} \geq 1$

Popper 02

1. The limit $\lim_{h \to 0} \dfrac{(1+h)^5 - 1}{h}$ represents the derivative of a function $f(x)$ at $x = 1$. What is $f(x)$?

5. Find the derivative of $f(x) = \dfrac{1}{x+1}$ using the definition of the derivative.

2. Find the derivative of $f(x) = \sqrt{2x+1}$ using the definition of the derivative.

Section 2.1 - The Derivative

If f is differentiable at $x = a$, then f is continuous at $x = a$.

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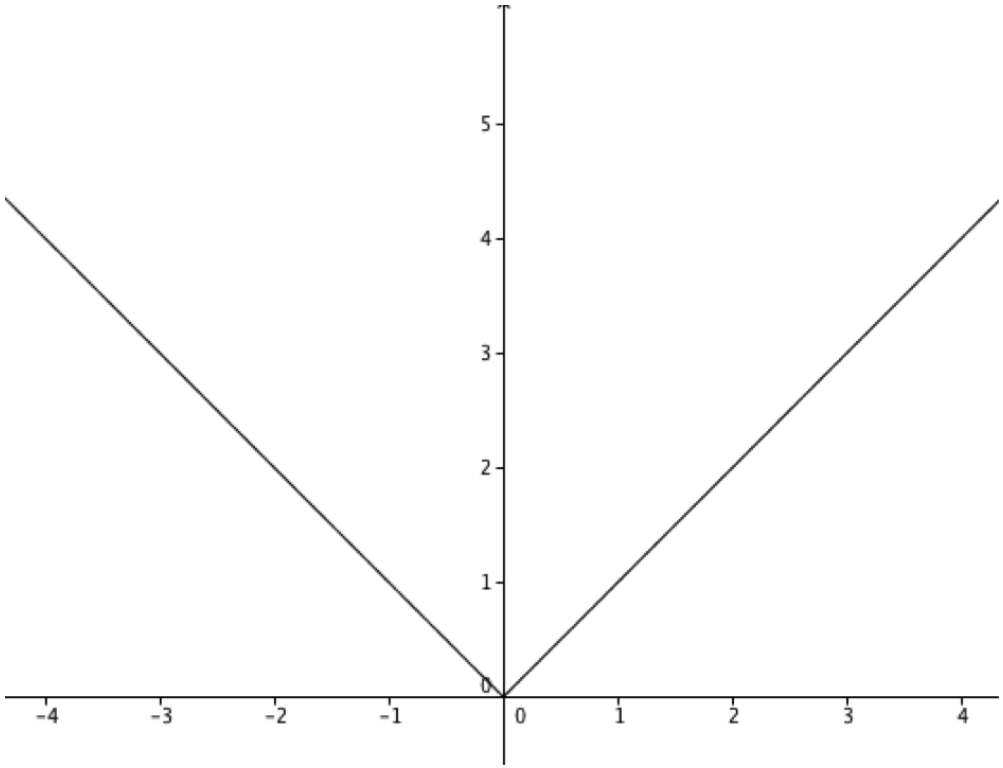
If f is differentiable at $x = a$, then f is continuous at $x = a$.

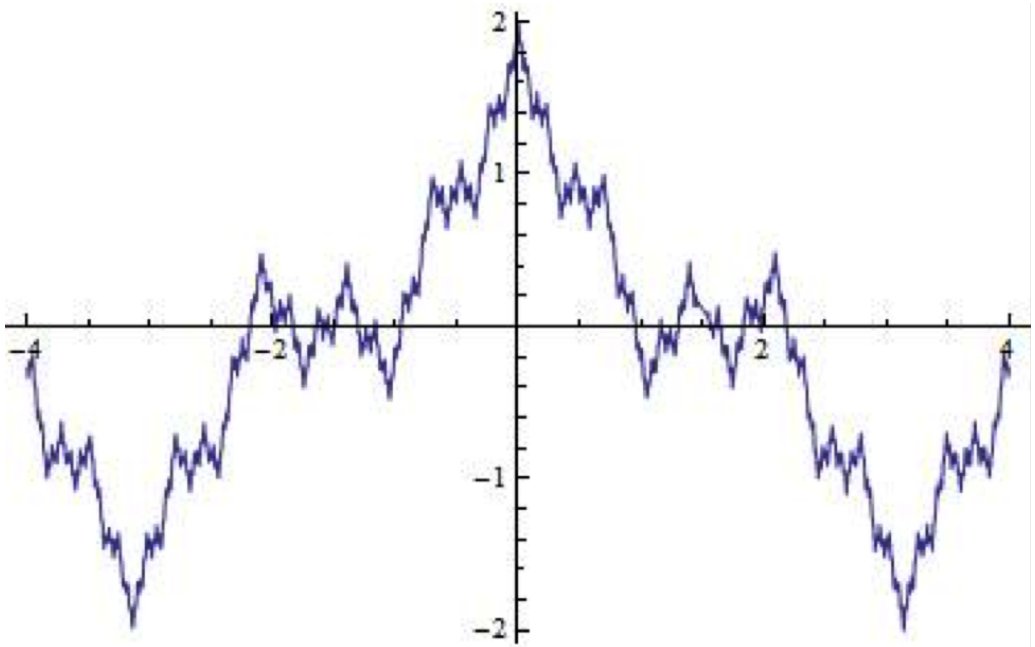
However, not every continuous function is differentiable.

Example: The function $y = |x|$ is continuous but not differentiable at $x = 0$.



Section 2.1 - The Derivative

The Weierstrass function is continuous everywhere and differentiable nowhere!



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A function is not differentiable at

- points of discontinuity
- cusps
- sharp turns (corners)

Popper 02

2. If a function is continuous, then it is guaranteed to be differentiable.

Example: Determine if $f(x)$ is differentiable at $x = 2$.

$$g(x) = \begin{cases} x^2 + 1 & x \leq 2 \\ 4x - 3 & x > 2 \end{cases}$$

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The normal line to the graph at $x = a$ is the perpendicular line to the graph at $x = a$.

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The normal line to the graph at $x = a$ is the perpendicular line to the graph at $x = a$.

That is:

The normal line is perpendicular to the tangent line at $x = a$.

Example: Give the slope of the normal line to the graph of $f(x) = \dfrac{1}{2x}$ at $x = -1$.

Popper 02

3. Give the slope of the normal line to the graph of $f(x) = \dfrac{1}{x+1}$ at $x = 3$. (Recall, $f'(x) = -\dfrac{1}{(x+1)^2}$)

Popper 02

4. Which of the following gives the first step for finding the derivative of $f(x) = 2\sqrt{x+1}$ using the definition of derivative?

Example: Determine if $f(x)$ is differentiable at $x = 2$.

$$g(x) = \begin{cases} x & x \leq 1 \\ x^2 & x > 1 \end{cases}$$

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5. Give the domain for $\dfrac{x^2-4}{x^2-3x+2}$