Math 10A
Worksheet, Discussion #5; Friday, 6/22/2018
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1 Derivative Definition

1.1 Concepts

1. The **derivative** of a function f at x_0 can be written as

$$f'(x_0) = \lim_{h \to 0} \frac{f(x_0 + h) - f(x_0)}{h} = \lim_{x \to x_0} \frac{f(x) - f(x_0)}{x - x_0}.$$

1.2 Example

2. Find $\lim_{x \to 1} \dfrac{e^{3x} - e^3}{x^2 - 1}$.

1.3 Problems

3. Find $\lim_{x \to 1} \dfrac{e^{\sqrt{x}} - e}{x^2 - 3x + 2}$.
4. Find $\lim_{x \to 0} \dfrac{\cos x - 1}{x^2 + x}$.
5. Find $\lim_{x \to \pi} \dfrac{\sin x}{x - \pi}$.
6. Find $\lim_{x \to 0} \dfrac{\tan x}{x}$.

1.4 Extra Problems

7. Find $\lim_{x \to 0} \dfrac{\sin x}{x}$.
8. Find $\lim_{x \to \pi/4} \dfrac{\cos x - \sqrt{2}/2}{x - \pi/4}$.
9. Find $\lim_{x \to \pi/3} \dfrac{\sin x - \sin(\pi/3)}{x - \pi/3}$.
10. Find $\lim_{x \to \pi/3} \dfrac{\sin x - \sqrt{3}/2}{x - \pi/3}$.