

# Lecture 18: Computation of Derivatives (Review)

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# Instructions

Compute the derivative of each of the following functions.

- You do not need to simplify.
- You do not need to show steps.
- No calculator is allowed.
- Be extremely careful with notations, signs, parentheses, etc.

# Handy Ones

$$\textcircled{1} \quad f(x) = \sqrt{x}$$

$$\textcircled{2} \quad f(x) = \frac{1}{x}$$

$$\textcircled{3} \quad f(x) = \ln(3x)$$

# Do You Really Need To?

$$\textcircled{1} \quad f(x) = 9 \ln \left( \frac{1}{x} \right)$$

$$\textcircled{2} \quad f(x) = -\frac{2}{x^2 + 1}$$

$$\textcircled{3} \quad f(x) = \frac{\sin^{-1}(2x)}{6}$$

# Confusing Constants

Classify the following expressions. Which of the following are power functions/exponential functions/constants?

①  $e^x$

②  $x^e$

③  $\pi^x$

④  $x^{\sqrt{\pi}}$

⑤  $e^\pi$

⑥  $7^e$

⑦  $e^e$

## Confusing Constants (cont')

$$\textcircled{1} \quad f(x) = \frac{7^\pi}{\sqrt[4]{x}} + \frac{x^\pi}{\sqrt[4]{7}} + \frac{7^x}{\sqrt[4]{7}}$$

$$\textcircled{2} \quad f(x) = \frac{e^x}{\sqrt{e}} + \frac{x^e}{\sqrt{x}} + \frac{e^{\sqrt{3}}}{\sqrt{5}}$$

$$\textcircled{3} \quad f(x) = \csc(x) \cot(3) + \csc(3) \cot(x) + \csc(x) \cot(x)$$

# Lengthy Calculations

$$\textcircled{1} \quad f(x) = \frac{2x \cot^3(x^2 - 4)}{e^{\sqrt{x}} + \sqrt{x}^e}$$

$$\textcircled{2} \quad f(x) = 2^\pi \ln(\sqrt{x}) + 2^{3x} \sqrt{\ln(x)} + 2^{\ln \sqrt{x}}$$

# Weird Tower Functions and Log Differentiation

①  $f(x) = x^{e^x} + e^{x^e}$

②  $f(x) = x^{x^e} + e^{e^x}$