

October 6, 2026

National Taco Day

Today in History:

First U.S. Train robbery (1866)

Jane Eyre is published (1847)

Number of the Day: 1833

1833 = $3 \times 13 \times 47$

1833 is the start of the first run of exactly 7 consecutive odd composite numbers.

Fun Fact:

The Beatles performed their first U.S. concert in Carnegie Hall.

Quote of the Day:

“Just Play. Have Fun. Enjoy the Game.”

Michael Jordan

Today's Weather:

Plentiful sunshine, high 67°

Math 121

Quiz #22

Find $f'(x)$ for

$$f(x) = (\ln(\ln x))^3 - 2^x + 1$$

$$f'(x) = 3(\ln(\ln x))^2 \left(\frac{1}{\ln x}\right)\left(\frac{1}{x}\right) - 2^x \ln 2$$

mpod *14

$$y = \sqrt[5]{\frac{x-1}{x+1}}$$

$$\frac{dy}{dx} = \frac{1}{5} \left(\frac{x-1}{x+1} \right)^{-\frac{4}{5}} \left(\frac{(x+1) - (x-1)}{(x+1)^2} \right)$$

$$\ln y = \ln \sqrt[5]{\frac{x-1}{x+1}}$$

$$\ln y = \frac{1}{5} (\ln(x-1) - \ln(x+1))$$

$$\frac{1}{y} \frac{dy}{dx} = \frac{1}{5} \left(\frac{1}{x-1} - \frac{1}{x+1} \right)$$

$$\frac{dy}{dx} = \frac{1}{5} \left(\frac{1}{x-1} - \frac{1}{x+1} \right) \sqrt[5]{\frac{x-1}{x+1}}$$

$$*11 \quad y = \ln(\ln(\ln x))$$

$$\frac{dy}{dx} = \frac{1}{\ln(\ln x)} \cdot \frac{1}{\ln x} \cdot \frac{1}{x}$$

HYPERBOLIC TRIG. FUNCTIONS

$$\sinh x = \frac{e^x - e^{-x}}{2} \quad \cosh x = \frac{e^x + e^{-x}}{2}$$

$$\cosh^2 x - \sinh^2 x = 1$$

$$y = \sinh x = \frac{e^x - e^{-x}}{2}$$

$$\frac{dy}{dx} = \frac{e^x + e^{-x}}{2} = \cosh x$$

$$y = \cosh x = \frac{e^x + e^{-x}}{2}$$

$$\frac{dy}{dx} = \frac{e^x - e^{-x}}{2} = \sinh x$$

$$y = \tanh x = \frac{\sinh x}{\cosh x}$$

$$\frac{dy}{dx} = \frac{(\cosh x)(\cosh x) - (\sinh x)(\sinh x)}{\cosh^2 x}$$

$$= \frac{\cosh^2 x - \sinh^2 x}{\cosh^2 x} = \frac{1}{\cosh^2 x}$$

$$\frac{dy}{dx} = \operatorname{sech}^2 x$$

$$y = \coth x = \frac{\cosh x}{\sinh x}$$

$$\frac{dy}{dx} = \frac{(\sinh x)(\sinh x) - (\cosh x)(\cosh x)}{\sinh^2 x}$$

$$= \frac{\sinh^2 x - \cosh^2 x}{\sinh^2 x} = \frac{-1}{\sinh^2 x}$$

$$= -\operatorname{csch}^2 x$$

$$y = \operatorname{sech} x = \frac{1}{\cosh x} = (\cosh x)^{-1}$$

$$\frac{dy}{dx} = -1 (\cosh x)^{-2} (\sinh x)$$

$$= -\frac{\sinh x}{\cosh^2 x} = -\frac{\sinh x}{\cosh x} \cdot \frac{1}{\cosh x}$$

$$= -\tanh x \operatorname{sech} x$$

$$y = \operatorname{csch} x$$

$$\frac{dy}{dx} = -\operatorname{csch} x \coth x$$

CIRC-

$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\sec^2 x$
$\cot x$	$-\csc^2 x$
$\sec x$	$\sec x \tan x$
$\csc x$	$-\csc x \cot x$

HYPER.

$\sinh x$	$\cosh x$
$\cosh x$	$\sinh x$
$\tanh x$	$\operatorname{sech}^2 x$
$\coth x$	$-\operatorname{csch}^2 x$
$\operatorname{sech} x$	$-\operatorname{sech} x \tanh x$
$\operatorname{csch} x$	$-\operatorname{csch} x \coth x$

$$y = \operatorname{ARCSINH} x$$

$$\sinh y = \sinh(\operatorname{ARCSINH} x) = x$$

$$\frac{d}{dx}(\sinh y = x)$$

$$(\cosh y) \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \frac{1}{\cosh y}$$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1+x^2}}$$

$$\cosh^2 y - \sinh^2 y = 1$$

$$\cosh^2 y = 1 + \sinh^2 y$$

$$\cosh^2 y = 1 + x^2$$

$$\cosh y = \sqrt{1+x^2}$$

$$\text{RECALL } y = \text{ARCSIN } x$$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$y = \text{ARCCOSH } x$$

$$\cosh y = \cosh(\text{ARCCOSH } x) = x$$

$$\frac{d}{dx} (\cosh y = x)$$

$$(\sinh y) \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \frac{1}{\sinh y}$$

$$\frac{dy}{dx} = \frac{1}{\sqrt{x^2-1}}$$

$$\cosh^2 y - \sinh^2 y = 1$$

$$\cosh^2 y - 1 = \sinh^2 y$$

$$x^2 - 1 = \sinh^2 y$$

$$\sinh y = \sqrt{x^2 - 1}$$

$$y = \text{ARCTANH } x$$

$$\tanh y = \tanh(\text{ARCTANH } x) = x$$

$$\frac{d}{dx} (\tanh y = x)$$

$$(\text{sech}^2 y) \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \frac{1}{\text{sech}^2 y}$$

$$\frac{dy}{dx} = \frac{1}{1-x^2}$$

$$\cosh^2 y - \sinh^2 y = 1$$

$$\cosh^2 y$$

$$1 - \tanh^2 y = \text{sech}^2 y$$

$$1 - x^2 = \text{sech}^2 y$$

RECALL

$$y = \arctan x$$

$$\frac{dy}{dx} = \frac{1}{1+x^2}$$