

October 2, 2026

International Day of Non-Violence

Today in History:

Thurgood Marshall sworn in on the Supreme Court (1967)

Darwin returns to England (1836)

Number of the Day: 228

$228 = 2 \times 2 \times 3 \times 19$

228 is 444 in base 7

Fun Fact:

In Bexley, Ohio Ordinance number 223, prohibits the installation and usage of slot machines in outhouses.

Quote of the Day:

"If you owe the bank \$100 that's your problem. If you owe the bank \$100 million, that's the bank's problem."

- J. Paul Getty

Today's Weather:

Rain continuing through 10am, high 71°

Math 121

Quiz #20

Find the equation of the tangent line at the point $(1, 0)$ to the curve

$$\frac{d}{dx} \left(x^3 + 2 \sin y = xy^2 + 1 \right)$$

$$3x^2 + 2 \cos y \left(\frac{dy}{dx} \right) = x 2y \frac{dy}{dx} + y^2 \Big|_{(1,0)}$$

$$3 + 2 \frac{dy}{dx} = 0 \quad \frac{dy}{dx} = -\frac{3}{2}$$

$$y - 0 = -\frac{3}{2}(x - 1)$$

INVERSE TRIG DER.

① $y = \text{ARCSIN } x$

$$\sin y = \sin(\text{ARCSIN } x) = x$$

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

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

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

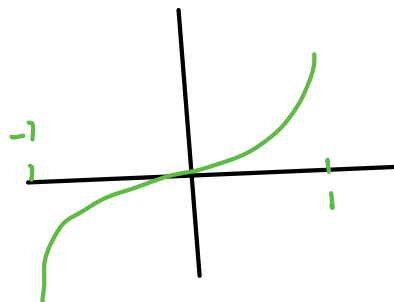
$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$\cos^2 y + \sin^2 y = 1$$

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

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

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



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

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

② $y = \text{ARCCOS } x$

$$\cos y = \cos(\text{ARCCOS } x) = x$$

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

$$-\sin y \left(\frac{dy}{dx} \right) = 1$$

$$\frac{dy}{dx} = \frac{-1}{\sin y}$$

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

$$\cos^2 y + \sin^2 y = 1$$

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

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

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

$$\textcircled{3} \quad y = \text{ARCTAN } x$$

$$\tan y = \tan(\text{ARCTAN } x) = x$$

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

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

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

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

$$\cos^2 y + \sin^2 y = 1$$

$$1 + \tan^2 y = \sec^2 y$$

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

$$\textcircled{4} \quad y = \text{ARC SEC } x$$

$$\sec y = \sec(\text{ARC SEC } x) = x$$

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

$$\sec y \tan y \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \frac{1}{\sec y \tan y}$$

$$\cos^2 y + \sin^2 y = 1$$

$$1 + \tan^2 y = \sec^2 y$$

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

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

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

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

$$\begin{array}{cc} f(x) & f'(x) \\ \star \text{ ARCSIN } x & \frac{1}{\sqrt{1-x^2}} \end{array}$$

$$\text{ARCCOS } x$$

$$\frac{-1}{\sqrt{1-x^2}}$$

$$\star \text{ ARCTAN } x$$

$$\frac{1}{1+x^2}$$

$$\text{ARCCOT } x$$

$$\frac{-1}{1+x^2}$$

$$\star \text{ ARCSEC } x$$

$$\frac{1}{|x| \sqrt{x^2 - 1}}$$

$$\text{ARCCSC } x$$

$$\frac{-1}{|x| \sqrt{x^2 - 1}}$$

CHAIN RULE

$$f(x) = \text{ARCSIN}(\text{STUFF})$$

$$f'(x) = \frac{\text{STUFF}'}{\sqrt{1 - (\text{STUFF})^2}}$$

EXAMPLE

$$f(x) = \text{ARCSIN}(e^x)$$

$$f'(x) = \frac{1}{\sqrt{1 - (e^x)^2}} \cdot e^x$$

$$f(x) = \text{ARCTAN}(\text{JUNK})$$

$$f'(x) = \frac{\text{JUNK}'}{1 + (\text{JUNK})^2}$$

EXAMPLE

$$f(x) = \text{ARCTAN}(x^2 + 1)$$

$$f'(x) = \frac{1}{1 + (x^2 + 1)^2} \cdot (2x)$$

$$f(x) = \text{ARCSEC}(\boxed{})$$

$$f'(x) = \frac{1}{|\boxed{}| \sqrt{\boxed{}^2 - 1}} \cdot \boxed{}'$$

EXAMPLE

$$f(x) = \text{ARCSEC}(\sin x)$$

$$f'(x) = \frac{1}{|\sin x| \sqrt{\sin^2 x - 1}} \cdot \cos x$$

$$f(x) = \sin(\text{ARCTAN} x)$$

$$f'(x) = \cos(\text{ARCTAN} x) \left(\frac{1}{1+x^2} \right)$$

$$f(x) = \frac{\cos x + e^x}{\text{ARCSIN}(x^3)}$$

$$f'(x) = \frac{\text{ARCSIN}(x^3) (-\sin x + e^x) - (\cos x + e^x) \left(\frac{3x^2}{\sqrt{1-(x^3)^2}} \right)}{(\text{ARCSIN}(x^3))^2}$$