

Unit 8 - Day 2 - Scavenger Hunt

Find the derivative!

J.

$$y = \frac{2-x}{3x+1}$$

$$= \frac{(3x+1)(-1) - (2-x)(3)}{(3x+1)^2}$$

$$= \frac{-3x-1 - (6-3x)}{(3x+1)^2}$$

$$= \frac{-3x-1-6+3x}{(3x+1)^2} = \boxed{\frac{-7}{(3x+1)^2}}$$

N.

$$y = \sqrt{3-2x}$$

$$(3-2x)^{1/2}$$

$$\frac{1}{2}(3-2x)^{-1/2}(-2)$$

$$= -(3-2x)^{-1/2}$$

$$\boxed{\frac{-1}{\sqrt{3-2x}}}$$

A.

$$y = \ln \frac{e^x}{e^x - 1}$$

$$\frac{(e^x-1)(e^x) - (e^x)(e^x)}{(e^x-1)^2}$$

$$= \frac{e^x}{e^x-1}$$

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

$$= \frac{-1}{e^x-1}$$

F.

$$y = \tan^{-1}(x/2)$$

$$\arctan\left(\frac{1}{2}x\right)$$

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

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

$$= \boxed{\frac{1}{2 + \frac{1}{2}x^2}} = \boxed{\frac{2}{4 + x^2}}$$

$$\frac{2}{x^2+4}$$

Q.

$$y = \frac{x^2}{\cos x}$$

$$\frac{(\cos x)(2x) - (x^2)(-\sin x)}{(\cos x)^2}$$

$$\frac{2x \cos x + x^2 \sin x}{\cos^2 x}$$

B.

$$y = \ln(\sec x + \tan x)$$

$$\frac{\sec x \tan x + \sec^2 x}{\sec x + \tan x}$$

$$\frac{\sec x (\tan x + \sec x)}{\sec x + \tan x}$$

$$\boxed{\sec x}$$

G.

$$y = \sin(1/x)$$

$$\sin(x^{-1})$$

$$\cos(x^{-1})(-1x^{-2})$$

$$\frac{-1 \cos(\frac{1}{x})}{x^2}$$

K.

$$y = 3^x$$

$$(\ln 3)(3^x)(1)$$

$$\boxed{3^x \ln 3}$$

C.

$$y = \csc 5x$$

$$-(\csc 5x \cot 5x)(5)$$

$$-5 \csc(5x) \cot(5x)$$

H.

$$y = \frac{|2x-1|}{|x-1|}$$

$$\frac{2x-1}{|x-1|} \cdot 2$$

$$\frac{4x-2}{|2x-1|}$$

V.

$$y = 3 \arccos(x/2)$$

$$3 \arccos\left(\frac{1}{2}x\right)$$

$$-\frac{1}{2} \cdot 3$$

$$\sqrt{1 - \left(\frac{1}{2}x\right)^2}$$

$$\frac{-3}{2\sqrt{1 - \frac{1}{4}x^2}}$$

D.

$$y = \log_2 x$$

$$\frac{1}{(\ln 2)(x)}$$

$$\frac{1}{x \ln 2}$$

M.

$$y = \operatorname{arcsec}(2x)$$

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

$$= \frac{2}{2|x| \sqrt{4x^2 - 1}}$$

$$= \frac{1}{|x| \sqrt{4x^2 - 1}}$$

H.

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

$$\frac{1}{\sqrt{1-x^2}} - \frac{1}{2}(1-x^2)^{-1/2}(-2x)$$

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

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

P.

$$y = \cot(4x)$$

$$- \csc^2(4x) \cdot 4$$

$$-4 \csc^2(4x)$$

E.

$$y = x^5 \tan x$$

$$(5x^4)(\tan x) + (x^5)(\sec^2 x)$$

$$5x^4 \tan x + x^5 \sec^2 x$$