3.9
49 $y = e^x$
(0, 0)
$y' = e^x$

Oct 23-10:10 AM

Opener

Non-Calculator

$\frac{d}{dx}\left(xe^{\ln x^2}\right) =$ x^3

(A) $1+2x$ (B) $x+x^2$ (C) $3x^2$ (D) x^3 (E) x^2+x^3

$f = x$ $g = e^{\ln x^2}$
$f' = 1$ $g' = e^{\ln x^2} \cdot \left(\frac{1}{x^2}\right) \cdot 2x$

$e^{\ln x^2} + xe^{\ln x^2} \cdot \frac{2}{x} = 3e^{\ln x^2}$

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1) True or False. The derivative of $y = 2^x$ is 2^x. Justify your answer. F $y' = 2^x \cdot \ln 2$

2) True or False. The derivative of $y = e^{2x}$ is $2(\ln 2)\, e^{2x}$. Justify your answer. F $y' = e^{2x} \cdot 2$

3) Which of the following is dy/dx if y = tan(4x)?

a) 4 sec(4x)tan(4x) b) sec(4x)tan(4x) c) 4 cot(4x)

d) $\sec^2(4x)$ e) 4 $\sec^2(4x)$ $y' = \sec^2(4x) \cdot 4$

Oct 19-10:14 AM

3-8 Derivaves of the Inverse Trig Funcons

Learning Objecves:

I can calculate the derivaves of the inverse trig funcons

I can calculate the derivaves of inverse funcons given informaon about the funcon.

Oct 1-8:22 AM

Derivaves of Inverse Trig Funcons

$\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$ $\frac{d}{dx}(\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}$

$\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$ $\frac{d}{dx}(\cot^{-1} x) = -\frac{1}{1+x^2}$

$\frac{d}{dx}(\sec^{-1} x) = \frac{1}{|x|\sqrt{x^2-1}}$ $\frac{d}{dx}(\csc^{-1} x) = -\frac{1}{|x|\sqrt{x^2-1}}$

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Ex1. Find the Derivave

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

$f' \cdot g + f \cdot g'$ $2x \sin^{-1} x + \frac{x^2}{\sqrt{1-x^2}}$

2.) $y = \frac{\cos^{-1} x}{e^x}$

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

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3.) $y = \sin^{-1}(4x)$

$y' = \frac{1}{\sqrt{1-(4x)^2}} \cdot 4$

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4.) $y = \cos^{-1}\left(\frac{2}{x}\right)$

$\frac{-2}{x^2} \cdot \frac{-1}{\sqrt{1-(\frac{2}{x})^2}} = \frac{2}{x^2\sqrt{1-\frac{4}{x^2}}}$

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

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

5.) $y = \tan^{-1}(x^2e^x)$

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

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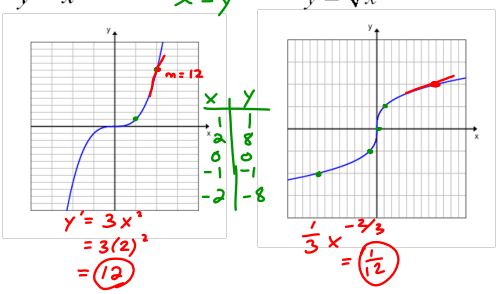
Inverse Funcons

$y = f(x)$ $\quad$ $y = f^{-1}(x)$

$y = x^3$ $\quad$ $x = y^3$ $\quad$ $y = \sqrt[3]{x}$



$y' = 3x^2$

$= 3(2)^2$

$= 12$

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

$= \frac{1}{12}$

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Ex.1 Certain values of the funcon f(x) and its derivaves f'(x) are shown in the table below

x	f(x)	f'(x)
1	5	-3
2	1	-7
3	-8	-1/2

a.) Find $\frac{d}{dx}\left(f^{-1}(x)\right)$ @ x=1

$f^{-1}(1, 2)$ $\quad -\frac{1}{7}$

$f(2, 1)$ $\quad -7$

b.) Find the equaon of the tangent line to $y = f^{-1}(x)$ @ x=1

$y - 2 = -\frac{1}{7}(x-1)$

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Homework

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