Opener

7. $\frac{d}{dx}\cos^2(x^3) =$

$[\cos(x^3)]^2$

$2[\cos(x^3)] \cdot -\sin(x^3) \cdot 3x^2$

(A) $6x^2\sin(x^3)\cos(x^3)$

(B) $6x^2\cos(x^3)$

(C) $\sin^2(x^3)$

(D) $-6x^2\sin(x^3)\cos(x^3)$

(E) $-2\sin(x^3)\cos(x^3)$

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3-9 day 1 Derivatives of Exponential Functions

Learning Objectives:

I can calculate the derivatives of exponential functions.

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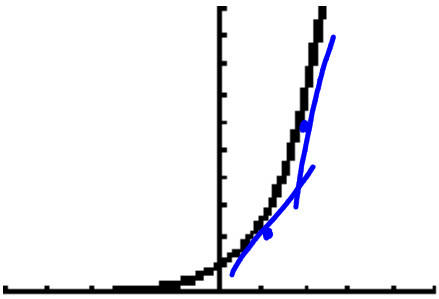
Derivatives of Exponential Functions

$$\frac{d}{dx}(e^x) = e^x$$



$$\frac{d}{dx}(b^x) = b^x \cdot \ln b$$

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Ex1. Differentiate

Product Rule

1.) $y = x^2 e^x$

$f = x^2$, $f' = 2x$; $g = e^x$, $g' = e^x$

$f'g + fg'$

$$y' = 2xe^x + x^2 e^x$$

2.) $y = \frac{\sin x}{e^x}$

$f = \sin x$, $f' = \cos x$; $g = e^x$, $g' = e^x$

Quotient Rule

$$\frac{f'g - fg'}{g^2}$$

$$y' = \frac{e^x \cos x - e^x \sin x}{e^{2x}}$$

3.) $y = \cos(e^x)$

Chain Rule

$$y' = -\sin(e^x) \cdot e^x$$

$$y' = -e^x \sin(e^x)$$

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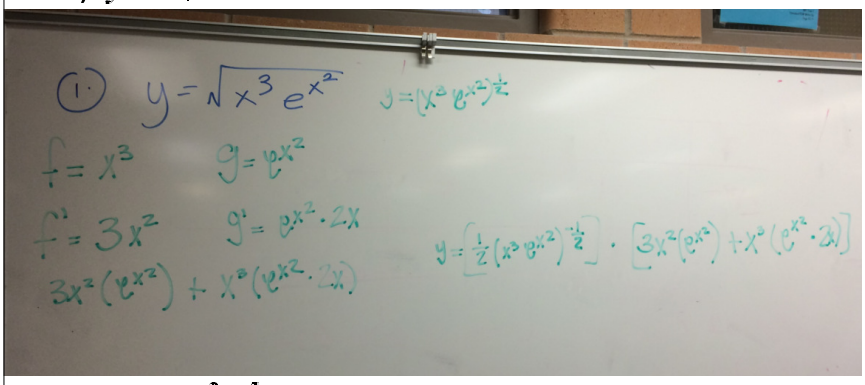
4.) $g(x) = e^{2x+1}$

$g' = e^{2x+1} \cdot 2 = \boxed{2e^{2x+1}}$

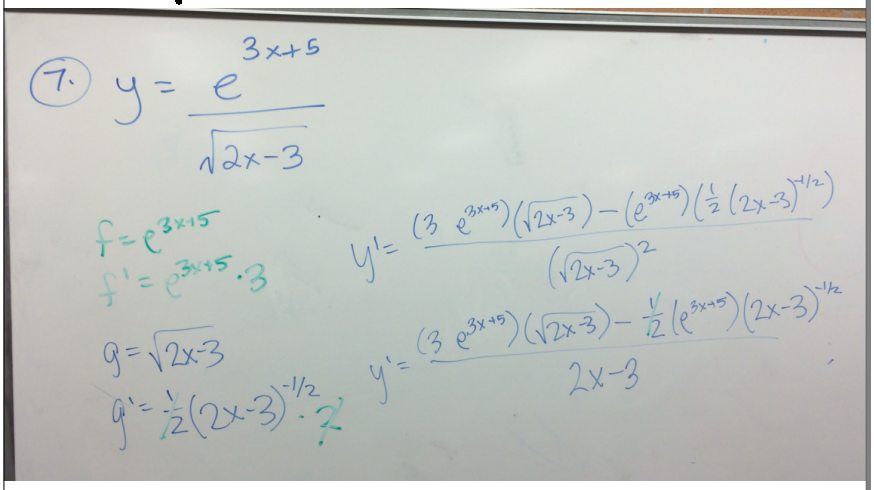
5.) $g(x) = e^{x^2+2x+5}$

$e^{x^2+2x+5}(2x+2)$

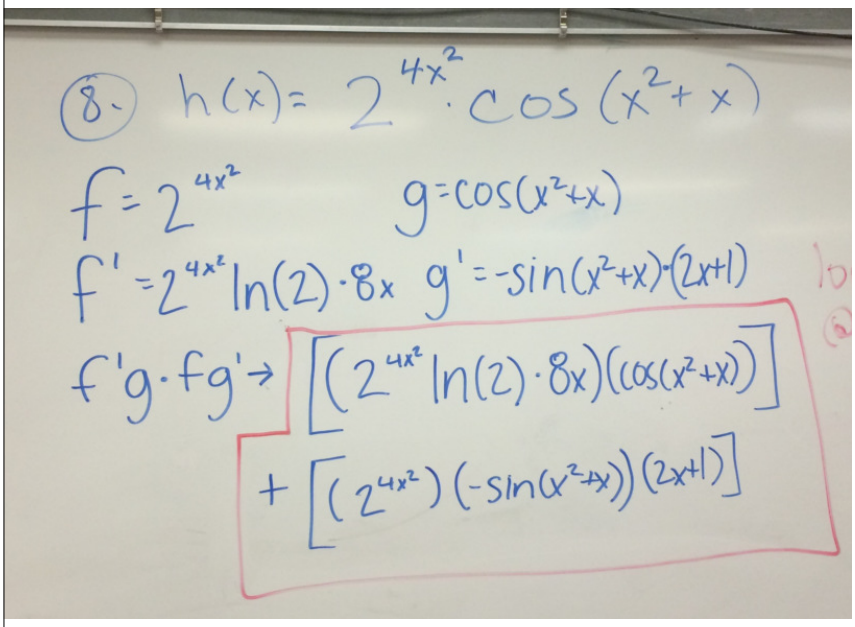
6.) $y = \sqrt{x^3 e^{x^2}}$



7.) $y = \dfrac{e^{3x+5}}{\sqrt{2x-3}}$



8.) $h(x) = 2^{4x^2}\cos(x^2 + x)$



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Homework

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