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MCV 4U
5.4

Differentiation Rules for Exponential Functions

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Some Derivatives

Calculate the following derivatives:

a) $f(x) = xe^x$ $f'(x) = 1e^x + e^x x = e^x(1+x)$

b) $f(x) = 5e^{2x-3}$ $f'(x) = 5e^{2x-3} \cdot 2 = 10e^{2x-3}$

c) $f(x) = x^6(4^x)$ $f'(x) = 6x^5 4^x + \ln 4 \cdot 4^x \cdot x^6$

d) $f(x) = x^6(4^x)$ $= x^5 \cdot 4^x (6 + x \ln 4)$

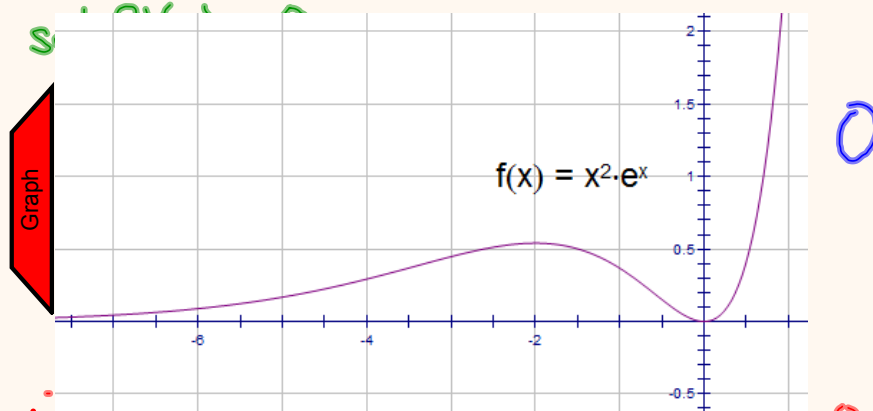
e) $f(x) = (3\cos^7 x)(9^{5x-2}) = 3(\cos x)^7(9^{5x-2})$

$f'(x) = 21\cos^6 x \cdot (-\sin x)(9^{5x-2})$
 $+ \ln 9 \cdot 9^{5x-2} \cdot 5 \cdot 3\cos^7 x$

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Extreme Values

Identify the local extrema of the function $f(x) = x^2 e^x$



$f(0) = 0$
 $\therefore (0, 0)$

↑
min

or $e = 0$ or $x = 0$
 $\ln e^x = \ln 0$
 $x \ln e = \ln 0$
 $x = \frac{\ln 0}{\ln e}$
 No Solutions

or $2+x = 0$
 $x = -2$
 $f(-2) = 0.54$
 $\therefore (-2, 0.54)$

↑
max

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Homework

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