



HW: Rules of Differentiation- Exponential Functions
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Find the derivative of the following functions: BOX YOUR ANSWER

If $f(x) = e^u$ then $f'(x) = U'e^u$ If $f(x) = a^u$ then $f'(x) = U'(\ln a)a^u$

1) $f(x) = \sqrt{2x + e^{10x}}$ $f(x) = (2x + e^{10x})^{1/2}$
 $f'(x) = \frac{1}{2} (2x + e^{10x})^{-1/2} (2 + 10e^{10x})$
 $f'(x) = \frac{(2 + 10e^{10x})}{2\sqrt{2x + e^{10x}}}$

2) $f(x) = 4e^{\frac{x}{2}} + \frac{5}{2x^2}$
 $f'(x) = 2e^{\frac{x}{2}} + \frac{5x^2}{2} = 10x$
 $f'(x) = 2e^{\frac{x}{2}} + 5x$

3) $f(x) = \frac{2x^3}{e^{2x}}$
 $f'(x) = \frac{(e^{2x})(6x^2) - (2x^3)(2e^{2x})}{(e^{2x})^2}$
 $f'(x) = \frac{(2x^2 e^{2x}) [3 - 2x]}{(e^{2x})^2}$
 $f'(x) = \frac{(2x^2)(3 - 2x)}{e^{2x}}$

4) $y = x^4(e^{1-2x})$
 $y' = (e^{1-2x})(4x^3) + (x^4)(-2e^{1-2x})$
 $y' = (x^3)(e^{1-2x}) [4 - 2x]$

5) $y = \frac{3}{e^{2x^2}}$
 $y' = \frac{e^{2x^2}(0) - (3)(4xe^{2x^2})}{(e^{2x^2})^2}$
 $y' = \frac{-12xe^{2x^2}}{(e^{2x^2})^2}$

6) $y = \frac{e^{x^2}}{2x}$
 $y' = \frac{(2x)(2xe^{x^2}) - (e^{x^2})(2)}{(2x)^2}$
 $y' = \frac{2x(e^{x^2})[-1]}{(2x)^2}$ $y' = \frac{-e^{x^2}}{2x}$

7) $y = e^{3x}(2x-1)^3$
 $y' = (2x-1)^3(3e^{3x}) + (e^{3x})(8(2x-1)^2)$
 $y' = [(2x-1)^3 e^{3x}] [3x - 3 + 8]$
 $y' = [(2x-1)^3 e^{3x}] (6x + 5)$

8) $f(x) = \frac{1}{6}e^{2x} + 2x^5$
 $f'(x) = \frac{1}{3}e^{2x} + 10x^4$