

Name Solutions

You have 13 minutes for this quiz – no calculators allowed.

1. (4 points) Determine the  $x$ -coordinate of each point on the graph of the following function for which the line tangent to the curve is horizontal.

$$y = 6x^3 e^{-x}$$

$$y' = (6x^3)'(e^{-x}) + (6x^3)(e^{-x})'$$

$$y' = 18x^2 e^{-x} - 6x^3 e^{-x}$$

$$y' = 6x^2 e^{-x} (3 - x)$$

$$y' = 0 \text{ when } x = 0 \text{ or } x = 3$$

2. (2 points each) Find derivatives of each of the following functions. You should always use proper notation.

(a)  $h(t) = \csc(e^{3t})$

$$h'(t) = -\csc(e^{3t}) \cot(e^{3t}) \cdot e^{3t} \cdot 3$$

$$(b) w = \left(\frac{5x}{2x+3}\right)^4$$

$$\begin{aligned}\frac{dw}{dx} &= 4 \left(\frac{5x}{2x+3}\right)^3 \cdot \left(\frac{5x}{2x+3}\right)' \\ &= 4 \left(\frac{5x}{2x+3}\right)^3 \cdot \left(\frac{(5)(2x+3) - (5x)(2)}{(2x+3)^2}\right) \\ &= \frac{60}{(2x+3)^2} \cdot \left(\frac{5x}{2x+3}\right)^3 \\ &= \frac{7500x^3}{(2x+3)^3}\end{aligned}$$

$$(c) f(x) = e^{2\ln(\sqrt{x^2+5})}$$

$$= e^{\ln(\sqrt{x^2+5})^2}$$

$$= e^{\ln(x^2+5)}$$

$$= x^2 + 5$$

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$$f'(x) = 2x$$

or use chain rule.