

1. Find the derivative of each of the following functions (12 minutes - all correct).

a. $y = x^9 + 10^x + e^{11}$

b. $y = e^{3x^2+1}$

c. $y = (x^2 + 2)^{3e}$

d. $y = (e^2 + 2)^{3x}$

e. $y = \sin(x) \cos(x)$

f. $y = \tan[(e^x + 1)^3]$

g. $y = \sec^2(2x)$

h. $y = \ln(e^x + 5)$

2. Compute the following derivatives in (a) through (h). Simplifying where necessary.

a. $\frac{d}{dx} \left(\frac{2\sqrt{x} + 1 - 5x}{\sqrt{x}} \right)$

b. $\frac{d}{dx} (x^3 \ln(x))$

c. $\frac{d}{dx} \left(\frac{e^{2x} - 2}{e^{2x} + 2} \right)$

d. $\frac{d}{dx} \left(\frac{2 \sin x - \cos x}{2 \sin x + \cos x} \right)$. Use the fact that $\sin^2(x) + \cos^2(x) = 1$ to simplify your answer.

c. $\frac{d}{dx} (\ln(2e^{3x} + 4))$

d. $\frac{d}{dx} (\log_5(5x^2 + 3))$

e. $\frac{d}{dx} \left((2 - e + \pi^2)^{x^2} \right)$

f. $\frac{d}{dx} \left((2 - x + \pi^2)^{e^2} \right)$

g. $\frac{d}{dx} \left((2 - e + x^2)^{x^2} \right)$

h. $\frac{d}{dx} \left(x e^{(x^2 - 3x + 1)} \right)$

3. Find $\frac{dy}{dx}$ if $x^3 - e^{xy} = x^2y^2$.