

$$59.) h(x) = \log_3 \frac{x \sqrt{x-1}}{2}$$

$$h(x) = \frac{1}{\ln 3} \left(\ln x + \frac{1}{2} \ln(x-1) - \ln 2 \right)$$

$$h'(x) = \frac{1}{\ln 3} \left(\frac{1}{x} + \frac{1}{2} \cdot \frac{1}{x-1} \right)$$

..

$$53.) \quad h(t) = \log_5(4-t)^2 \quad -\frac{1}{2} \quad \frac{-1}{2} \quad \frac{1}{-2}$$

$$h(t) = \frac{1}{\ln 5} \cdot 2 \ln(4-t)$$

$$h'(t) = \frac{2}{\ln 5} \cdot \frac{-1}{4-t}$$

$$= \frac{-2}{\ln 5(4-t)} = \frac{2}{\ln 5(t-4)}$$

$$47.) \quad g(t) = t^2 2^t$$

$$g'(t) = t^2 \cdot \ln 2 \cdot 2^t + 2^t \cdot 2t$$

$$= t 2^t (t \ln 2 + 2)$$

$$(63.) y = 2^{-x} \quad (-1, 2)$$

$$y' = \ln 2 \cdot 2^{-x} (-1)$$

$$y'(-1) = -\ln 2 \cdot 2$$

$$= -2 \ln 2 \leftarrow \ddot{v}$$

$$= \ln \frac{1}{4} \leftarrow \text{optional}$$

$$y - 2 = \ln \frac{1}{4} (x + 1)$$

Derivatives for: $y = \ln u$ $y = e^u$ $y = a^u$ $y = \log_a u$

Find a slope

Write an equation of a tangent line

Relative extrema

Points of inflection

implicit differentiation

$$\frac{-1}{1-x} = \frac{1}{x-1}$$

$$2 \ln 6$$

$$\ln 36$$

$$-2 \ln 3 = \ln \frac{1}{9}$$

$$\textcircled{1} y = \ln\left(\frac{2e^x}{x^2+1}\right) \quad \textcircled{2} y = e^{4x} \cdot 2^x \quad \textcircled{3} y = \log_2 \sqrt{1-x}$$

$$\textcircled{4} y = (\ln x)^4 \quad \textcircled{5} y = \ln(x^3-1)^7 \quad \textcircled{6} y = 4^{2x}$$

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$$y = \ln 2 + \ln e^x - \ln(x^2+1) \quad y' = e^{4x} \cdot \ln 2 \cdot 2^x + 2^x \cdot 4e^{4x} \quad y = \frac{1}{2\ln 2} \ln(1-x)$$

$$y' = 1 - \frac{2x}{x^2+1} \quad y' = 2^x e^{4x} (\ln 2 + 4) \quad y' = \frac{1}{\ln 4} \cdot \frac{-1}{1-x}$$

$$y' = \frac{1}{\ln 4(x-1)}$$

$$\textcircled{4} y = (\ln x)^4$$

$$y' = 4(\ln x)^3 \cdot \frac{1}{x}$$

$$y' = \frac{4(\ln x)^3}{x}$$

$$\textcircled{5} y = \ln(x^3-1)^7$$

$$y = 7 \ln(x^3-1)$$

$$y' = \frac{7 \cdot 3x^2}{x^3-1}$$

$$y' = \frac{21x^2}{x^3-1}$$

$$\textcircled{6} y = 4^{2x}$$

$$y' = \ln 4 \cdot 4^{2x} \cdot 2$$

$$y' = 2 \ln 4 \cdot 4^{2x}$$

Find dy/dx using implicit differentiation

$$e^x y - x^5 + 3y = 8$$

Write the equation of a tangent line for
 $y = xe^{2x}$ at $(1, e^2)$

Find the points of inflection given

$$y' = x^2/e^x$$

Find the relative extrema for $y = \ln x/x$