

Just write your natural name: Key Period: _____

AP Calculus AB: 3.7 Derivatives of Natural Logs

Find the instantaneous rate of change of each of the following functions.

1) $f(x) = \ln(-6x^4 + 4x - 9)$

$$f'(x) = \frac{-24x^3 + 4}{-6x^4 + 4x - 9}$$

2) $f(x) = \ln\left(\frac{5}{2x^3}\right)$

$$f'(x) = \frac{-3}{x}$$

3) $f(x) = \ln\left(\frac{3}{\sqrt{x}}\right) + e^x$

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

4) $f(x) = e^{7x^3} - \ln(x)$

$$f'(x) = 21x^2 e^{7x^3} - \frac{1}{x}$$

5) Find the instantaneous rate of change of the function $s(t) = \frac{5}{\sqrt{t^3}} - \ln(3 - 4t)$ at the value $t=1$.

$$s(t) = 5t^{-3/2} - \ln(3 - 4t)$$

$$s'(t) = \frac{-15}{2\sqrt{t^5}} + \frac{4}{3 - 4t}$$

$$s'(1) = \frac{-23}{2}$$

Calculator Problem

6) Find the point where the function $h(x) = \ln\left(\frac{3x+2}{x^2}\right)$ has a slope of a tangent line that is equal to 9. (Ans: $(-\frac{4}{9}, 3\ln(\frac{3}{2}))$ and $(-\frac{1}{3}, 2\ln(3))$)

$$h'(x) = .22$$