

Calculus I

Homework

Logarithmic derivatives

1. Compute the derivative.

(a) $\ln(4x)$

(b) $\ln(-13x)$

(c) $\log_2(5x)$

(d) $\log_{10}(-3x)$

(e) $x^6 \ln(2x)$

(f) $x^4 \ln(2x)$

(g) $\ln(x^4)$

(h) $(\ln(x))^4$

(i) $\ln(7x+1)$

(j) $\ln(-6x+2)$

(k) $\ln\left(\frac{3x-2}{-2x+3}\right)$

(l) $\ln\left(\frac{5x-4}{-x-5}\right)$

(m) $\ln\left(\frac{3x+1}{4x-5}\right)$.

(n) $\ln(\cot x)$

(o) $\ln(\sec(2x))$

(p) $f(x) = \ln(\sec x) + \ln(\cot x)$.

2. Differentiate.

(a) 10^{x^3} .

(b) $2^{\tan x}$.

(c) x^x .

(d) x^{x^x} .

(e) $(\sin x)^{\cos x}$.

(f) $(\ln x)^{\ln x}$.

3. Find the limit.

(a) $\lim_{x \rightarrow \infty} \left(1 - \frac{2}{x}\right)^x$.

(b) $\lim_{x \rightarrow 0} (1-x)^{\frac{1}{x}}$.

(c) $\lim_{x \rightarrow \infty} \left(\frac{x}{x-5}\right)^x$.

(d) $\lim_{x \rightarrow \infty} \left(\frac{x}{x-2}\right)^{3x+2}$.