

Differentiate each of the following by hand.

1.  $f(x) = \frac{x}{1 - \ln(x - 1)}$

2.  $y = \frac{\ln(\ln(x))}{x}$

3.  $f(t) = \ln(t^3 - e^{4t} + 3)$

4.  $f(x) = \log_{10}(x\sqrt{x^2 - 1})$

5.  $h(t) = t \ln(t) - t$

6.  $f(x) = 3x \log_5(\sqrt{x})$

7.  $S(x) = \ln\left(\frac{(2x + 1)^5}{\sqrt{x^2 - 1}}\right)$