

Find the derivative of each function.

1.  $x \ln(x) - x$

2.  $3^{2x \cos(x)}$

3.  $\frac{x^{42} + 3 \tan(x^2)}{e^{3x} - \sqrt{x}}$

4.  $\log_4 \left( \cos(e^x) e^{5x^2} \right) + \cot(e)$