

Exercise 9Calculate y' .

$$y = \ln(x \ln x)$$

SolutionCalculate y' by using the chain and product rules.

$$\begin{aligned}y' &= \frac{d}{dx} \ln(x \ln x) \\&= \frac{1}{x \ln x} \cdot \frac{d}{dx}(x \ln x) \\&= \frac{1}{x \ln x} \cdot \left\{ \left[\frac{d}{dx}(x) \right] \ln x + x \left[\frac{d}{dx}(\ln x) \right] \right\} \\&= \frac{1}{x \ln x} \cdot \left[(1) \ln x + x \left(\frac{1}{x} \right) \right] \\&= \frac{1}{x \ln x} \cdot (\ln x + 1) \\&= \frac{\ln x + 1}{x \ln x}\end{aligned}$$