Answer on Question #71099 – Math – Calculus

Question

Given that n is a positive integer, find $\frac{d}{dx}(x \cdot (\ln x)^n)$.

Solution

Applying the product rule and the chain rule

(see https://en.wikipedia.org/wiki/Differentiation_rules#Elementary_rules_of_differentiation),

we get

$$\frac{d}{dx}(x \cdot (\ln x)^n) = (\ln x)^n \cdot \frac{dx}{dx} + x \cdot \frac{d}{dx}((\ln x)^n) = (\ln x)^n + x \cdot n(\ln x)^{n-1} \cdot \frac{d \ln x}{dx} =$$

$$= (\ln x)^n + x \cdot n(\ln x)^{n-1} \cdot \frac{1}{x} = (\ln x)^n + n(\ln x)^{n-1}.$$

Answer: $(\ln x)^n + n(\ln x)^{n-1}$.