

Question 4

Identify the hidden derivative and evaluate:

$$\int \frac{\ln x}{x} dx.$$

Question 4 – Solution

Step 1: Identify the inner function. Since

$$\frac{d}{dx}(\ln x) = \frac{1}{x},$$

the factor dx/x is the differential of $\ln x$.

Step 2: Substitute $u = \ln x$. Then

$$du = \frac{dx}{x}.$$

Step 3: Rewrite and integrate.

$$\begin{aligned}\int \frac{\ln x}{x} dx &= \int u du \\ &= \frac{u^2}{2} + C.\end{aligned}$$

Step 4: Return to x .

$$\boxed{\frac{1}{2}(\ln x)^2 + C}$$