

Question 2

Evaluate the integral

$$\int \frac{\ln(x^2 + 1)}{x^2 + 1} x \, dx.$$

Question 2 - Solution

Use substitution. Let

$$u = \ln(x^2 + 1).$$

Then

$$du = \frac{2x}{x^2 + 1} dx \quad \Rightarrow \quad \frac{x}{x^2 + 1} dx = \frac{1}{2} du.$$

Substitute:

$$\int \frac{\ln(x^2 + 1)}{x^2 + 1} x dx = \frac{1}{2} \int u du.$$

Integrate:

$$\frac{1}{2} \int u du = \frac{1}{4} u^2.$$

Substitute back:

$$\boxed{\frac{1}{4} (\ln(x^2 + 1))^2 + C}$$