

Question 1

Evaluate the integral

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

Question 1 - Solution**Step 1: Choose a substitution**

Set $u = 1 + \ln(1 + x^2)$, so $du = 2x/(1 + x^2) dx$.

$$\int \frac{x}{1 + x^2} \sqrt{1 + \ln(1 + x^2)} dx = \frac{1}{2} \int u^{1/2} du = \frac{1}{3} u^{3/2} + C.$$

$$\frac{1}{3} (1 + \ln(1 + x^2))^{3/2} + C.$$

This is valid for every real x .