

Question 10

Find an antiderivative of

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

Question 10 - Solution

Use the substitution

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

Then

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

Rewrite the integral:

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

Integrate:

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

Substitute back:

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