Integration by Parts

Study Goals: • Learning integration by parts

1. Evaluate using integration by parts
   (a) $\int xe^x \, dx$

   (b) $\int \arctan x \, dx$

2. Evaluate using integration by parts
   (a) $\int \frac{\ln x}{x^2} \, dx$

   (b) $\int x \tan^2 x \, dx$. (Hint: Start by using $\tan^2 x + 1 = \sec^2 x$.)
3. Use “process of elimination” to evaluate the integral \( \int \frac{\ln(x^2 + 1)}{x^2} \, dx \).

(a) Try substitution. Write down two possible choices of \( u \). For each choice, either solve the problem or explain clearly why the choice does not work.

(b) Try parts. Write down two possible choices of \( u \) and \( dv \). For each choice, either solve the problem or explain clearly why the choice does not work.

4. Use “process of elimination” to evaluate the integrals.

(a) \( \int x^3 \sqrt{x^2 + 1} \, dx \)

(b) \( \int e^{\sqrt{x}} \, dx \)