Repeated Integration by Parts  (Section 7.2 Part 2)

Warm-up:

1. Evaluate from memory: \( \int \ln x \, dx \)

2. Evaluate using integration by parts (and u-substitution): \( \int x e^{-x} \, dx \)

Repeated Integration by Parts

Example 1: Evaluate \( \int x^2 e^{-x} \, dx \)

Example 2: \( \int e^{x} \cos x \, dx \)

A Tabular Method for Repeated Integration by Parts

This method can be used for integrals of the form _______________________, where \( p(x) \) is a ______________________.

Steps for Tabular Integration by Parts:

1. _______________________________________________ ______________________

2. _______________________________________________ ______________________

3. _______________________________________________ ______________________

4. _______________________________________________ ______________________

5. _______________________________________________ ______________________
Example 3: Evaluate \( \int (x^2 - x) \cos x \, dx \)

Practice Problem 1: Redo Example 1 using tabular integration by parts: \( \int x^2 e^{-x} \, dx \)

Practice Problem 2: Evaluate \( \int x^2 \sqrt{x-1} \, dx \) using tabular integration by parts.

Example 4: Use integration by parts to evaluate the integral \( \int_0^{\pi/2} x \sin 3x \, dx \)