

AP Calculus BC
Unit 8 – Integration Techniques

Day 5 Notes: Integration by Parts

We use integration by parts (IBP) for integrands involving products of **unrelated algebraic and transcendental functions.

$$\int u \, dv = uv - \int v \, du$$

-Here is an acronym that will be helpful when trying to decide which function in the integrand should be u:

LIATE

L = logarithm

I = inverse trig

A = algebraic

T = trig

E = exponential

(Whichever function comes first in the acronym should be defined as u.)

<p><u>Example 1:</u></p> $\int x e^{2x} dx$	<p><u>Example 2:</u></p> $\int \ln x dx$
<p><u>Example 3:</u></p> $\int x^3 \ln x dx$	<p><u>Example 4:</u></p> $\int \theta \sec \theta \tan \theta$

Example 5:

$$\int x\sqrt{x-3}dx$$

Why is IBP not appropriate for this integrand?

Example 6:

$$\int x^2e^{-x}dx$$

Example 7:

$$\int e^x \sin 2x dx$$

Example 8:

$$\int \sec^3 3x dx$$

AP Calculus BC
Unit 8 – Day 5 – Assignment

Name: _____

Evaluate the indefinite integral.

1) $\int xe^{-2x} dx$	2) $\int x \cos x dx$
3) $\int \ln(3x) dx$	4) $\int \frac{2x}{e^x} dx$
5) $\int x^2 \cos x dx$	6) $\int x \csc x \cot x dx$

7)

$$\int x^3 e^x dx$$

8)

$$\int e^{2x} \sin x dx$$

9)

$$\int 4 \arccos x dx$$

10)

$$\int e^x \cos 2x dx$$