

Unit #2: Methods of Integration

Topic: A Special Case of Integration by Parts

Objective: *SWBAT solve for an unknown integral by using integration by parts.*

## Warm Up #8:

Evaluate the following integral:  $\int_1^2 x^3 \ln|x| dx$

Sometimes making repeated use of integration by parts will still result in an integral that cannot be evaluated easily. In these cases, we need to use the integration by parts formula twice and then solve for what is known as the *unknown integral*.

*Example #1:* Evaluate  $\int e^x \cos x dx$

*Example #2:* Evaluate  $\int \frac{\sin x}{e^{2x}} dx$

*Problem Set #8: Use integration by parts and solve for the unknown integral.*

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

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

$$3) \int e^{2x} \cos 3x dx$$

**Answer Key:**

$$1) \frac{2e^x \sin 2x + e^x \cos 2x}{5} + C$$

$$2) \frac{-2e^{-x} \cos 2x - e^{-x} \sin 2x}{5} + C$$

$$3) \frac{3e^{2x} \sin 3x + 2e^{2x} \cos 3x}{13} + C$$

