

Lab 5 - Pattern Recognition

For each part, use Derive to evaluate the integrals in the “**Explore**” section. Then use these results to give a guess for the “**Conjecture**” integral.

1. Partial Fraction Type

• **Explore:**

$$\int \frac{1}{(x+2)(x+3)} dx =$$

$$\int \frac{1}{(x+2)(x+5)} dx =$$

$$\int \frac{1}{(x+2)(x-5)} dx =$$

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

• **Conjecture:** $\int \frac{1}{(x+a)(x+b)} dx =$

2. Sine and Cosine Products

• **Explore:**

$$\int \sin x \cos 2x dx =$$

$$\int \sin 3x \cos 7x dx =$$

$$\int \sin 8x \cos 3x dx =$$

• **Conjecture:** $\int \sin ax \cos bxdx =$

3. Natural Logs

- **Explore:**

$$\int \ln x dx =$$

$$\int x \ln x dx =$$

$$\int x^2 \ln x dx =$$

$$\int x^3 \ln x dx =$$

$$\int x^7 \ln x dx =$$

- **Conjecture:** $\int x^n \ln x dx =$

4. Exponentials

- **Explore:**

$$\int x e^x dx =$$

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

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

$$\int x^4 e^x dx =$$

$$\int x^5 e^x dx =$$

- **Conjecture:** $\int x^n e^x dx =$