

Integration by Parts

Product Rule

$$\frac{d}{dx} \left[f(x) g(x) \right] = f'(x) g(x) + f(x) g'(x)$$

Integration by Parts

$$\int f(x) g(x) dx = F(x) g(x) - \int F(x) g'(x) dx$$

1. Compute derivative and integral.

$$\frac{d}{dx} \left[4x e^{5x} \right]$$

$$\int 4x e^{5x} dx$$

$$\frac{d}{dx} \left[2x \sin(3x) \right]$$

$$\int 2x \sin(3x) dx$$

$$\frac{d}{dx} \left[2x \ln(x) \right]$$

$$\int 2x \ln(x) dx$$

$$\frac{d}{dx} \left[x \sec(x) \tan(x) \right]$$

$$\int x \sec(x) \tan(x) dx$$

2. Substitute then integrate by parts:

$$\int e^{\sqrt{x}} dx$$

3. Solve using integration by parts:

$$\int \ln(x) dx$$

$$\left| \int \arctan(x) dx \right|$$

4. Use double integration by parts:

$$\int x^2 \sin(3x) dx$$

5. Use circular integration by parts:

$$\int \sin x \cos x dx$$

6. Figure out the reduction formula for

$$\int \cos^n(x) dx$$