1. **Theorem: Integration by Parts**

   If \( u \) and \( v \) are functions of \( x \) and have continuous derivatives, then
   \[
   \int u \, dv = uv - \int v \, du
   \]

2. **Guidelines for Integration by Parts**

   1. Let \( dv \) = the most complicated part of the integrand that fits a basic integration rule. Then let \( u \) = remaining part.

   2. Let \( u \) = the part of the integrand whose derivative is a function simpler than \( u \). Then let \( dv \) = remaining part.

3. **Common Integrals Using Integration by Parts:**

   1. Given \( \int x^n e^{ax} \, dx \), \( \int x^n \sin ax \, dx \), or \( \int x^n \cos ax \, dx \)

      Let \( u = x^n \); \( dv = e^{ax} \, dx \), \( \sin ax \, dx \), \( \cos ax \, dx \).

   2. Given \( \int x^n \ln x \, dx \), \( \int x^n \sin^{-1} ax \, dx \), or \( \int x^n \tan^{-1} ax \, dx \)

      Let \( u = \ln x \), \( \sin^{-1} x \), \( \tan^{-1} x \); \( dv = x^n \, dx \).

   3. Given \( \int e^{ax} \sin bx \, dx \), \( \int e^{ax} \cos bx \, dx \)

      Let \( u = \sin bx \) or \( \cos bx \); \( dv = e^{ax} \, dx \). (We need to use the "combining the like terms"-method.)