Integration by Parts

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

Set up *u* & *dv* in the box.
Choose *u* in the order LIPET (works most of the time)

L=Natural Logarithm
I= Inverse Trig
P= Polynomial
E= Exponential
T= Trigonometric

u	*v*
du	*dv*

Find:

**1. $\int xe^{2x}dx$

2. $\int \ln x\,dx$

**3. $\int x\sec^2 x\,dx$

4. $\int e^x \cos 6x\,dx$

5. $\int x^3 \ln x\,dx$

6. $\int x^2 \sin x\,dx$

7. $\int_0^1 \tan^{-1} x\,dx$

8. Find the area of the region bounded by the curve $y = xe^{-x}$ and the x-axis from $x = 0$ to $x = 3$.

The **Tabular method** may be used as a short-cut to repeated integration by parts if *u* is a power of *x* (polynomial) and *dv* is something that can be easily integrated.

+/-	u (& derivative)	dv (& antiderivative)
+		
-		
+		
-		

Integrate by parts using tabular method.

1. $\int x^3 \sin(x)dx$

+/-	u	dv
+		
-		
+		
-		
+		

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

+/-	u	dv
+		
-		
+		
-		

Practice: Integrate

1. $\int x^2 e^{2x} dx$

2. $\int x \sec x \tan x \, dx$

3. $\int \left(\sqrt{x} \ln x\right) dx$

4. $\int t^3 e^t dt$

5. $\int e^x \cos x \, dx$