Calc BC Tabular $uv - \int vdu$ WS Name: Block: Seat:

Ultra-Violet VooDoo (integration by parts) with a Table

The application of

$$udv = uv \int vdu$$

is to reduce an integral of the product of functions into a one involving a simpler integral. This process might require more than one step, so the tabular method is very popular organized approach to doing this "integration by parts"

1. Example: $\int 2x^2 \sin x \; dx$

u	dv
$2x^2$	$\sin x$
$4x$	$-\cos x$
4	$-\sin x$
0	$\cos x$

Therefore $\int 2x^2 \sin x \; dx = -2x^2 \cos x + 4x \sin x + 4 \cos x + C$

2. $\int 5x^3 \cos x \; dx$

u differentiate	dv integrate

3. $\int x \sin 3x \; dx$

u differentiate	dv integrate
$+$ ↘	
$-$ ↘	
$+$ ↘	
$-$ ↘	

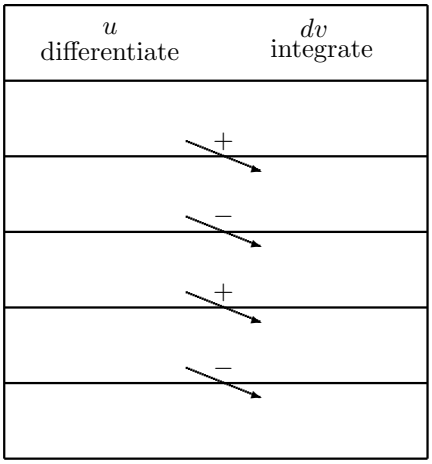
4. $\int x5^x \; dx$

u differentiate	dv integrate
$+$ ↘	
$-$ ↘	
$+$ ↘	
$-$ ↘	

5. $\int e^x \sin x \; dx$

Hint: This one looks like there is no progress, but note how algebra can come to the rescue:

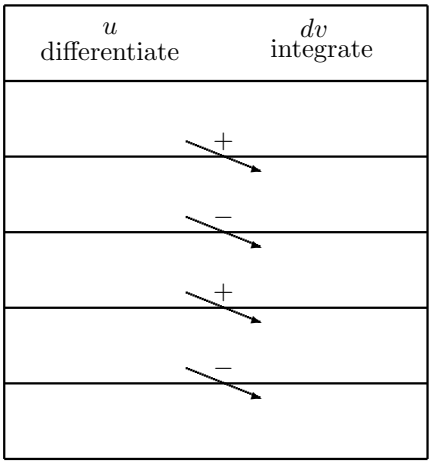
$$\int a = bc - \int a$$
$$2\int a = bc$$
$$\int a = \frac{1}{2}bc$$



6. $\int \arctan x \; dx$

Hint 1: Make $u = \arctan x$, so $du = \frac{1}{1+x^2}dx$ and let $dv = dx$

Hint 2: Maybe u substitution for $= 1 + x^2$ would be better than $uv - \int v du$



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

u differentiate	dv integrate
$+$ ↘	
$-$ ↘	
$+$ ↘	
$-$ ↘	

8. $\int \frac{x^2}{e^{2x}} \, dx$

u differentiate	dv integrate
$+$ ↘	
$-$ ↘	
$+$ ↘	
$-$ ↘	

(3) $\frac{1}{9}(\sin 3x - 3x\cos 3x) + C$, (4) $\frac{2^x}{\ln^2 2}(x\ln 2 - 1) + C$, (5) $\frac{1}{2}e^x(\sin x - \cos x) + C$