

**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:

$$\int a = bc - \int a$$

$$2 \int a = bc$$

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

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

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  $uv - \int v du$

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

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

$u$ differentiate	$dv$ integrate
	+ /
	- /
	+ /
	- /

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

$u$ differentiate	$dv$ integrate
	+ /
	- /
	+ /
	- /