NWOKORIE PASCAL CHINAMDI
MECHATRONICS ENGINEERING
19/ENG05/043

1) $e^x \sin x \, dx$.

let $u = e^x$, $dv = \sin x$

$\frac{du}{dx} = e^x$ $\quad v = -\cos x$

Using $uv - \int v \, du$

$(e^x)(-\cos x) - \int (-\cos x)(e^x) \, dx$

$= -e^x \cos x - \int -e^x \cos x \, dx$

$\therefore \int -e^x \cos x \, dx = \begin{cases} \text{let } u = -e^x, & dv = \cos x \\ du/dx = -e^x, & v = \sin x \end{cases}$

$[(-e^x)(\sin x) - (-\cos x)(-e^x)] + C$

$(-e^x \sin x - e^x \cos x) + C$

$\int e^x \sin x \, dx =$

$-e^x \cos x + e^x \sin x + e^x \cos x + C$

$= e^x \sin x + C$

2) $2x^2 \ln x \, dx$.

let $u = 2x^2$, $dv = \ln x$

$\frac{du}{dx} = 4x$, $v = 1/x$

Using $uv - \int v \, du$

$(2x^2)(1/x) - \int (1/x)(4x) \, dx$

$\frac{2x^2}{x} - \int \frac{4x}{x} = \frac{2x^2}{x} - 4\int \frac{x}{x} = \frac{2x^2}{x} - 4\int 1$

$= 2x - 4x + C$

3) $x^2 \sin x \, dx$.

Let $u = x^2$, $dv = \sin x$

$\frac{du}{dx} = 2x$ $\quad v = -\cos x$

Using $uv - \int v \, du$

$(x^2)(-\cos x) - \int (-\cos x)(2x)\,dx$

$\int -2x\cos x\,dx =$ let $u = -2x$, $dv = \cos x$

$du/dx = -2$, $v = \sin x$

$(-2x)(\sin x) - \int \sin x(-2)\,dx$

$-2x\sin x + 2(-\cos x) + C$

$-2x\sin x - 2\cos x + C$

$$\int x^2 \sin x\,dx = -x^2\cos x + 2x\sin x + 2\cos x + C$$

4) $x\cos x\,dx$

let $u = x$, $dv = \cos x$

$du/dx = 1$, $v = \sin x$

Using $uv - \int v\,du$

$(x)(\sin x) - \int (\sin x)(1)\,dx$

$x\sin x - (-\cos x) + C$

$$\int x\cos x\,dx = x\sin x + \cos x + C$$