Edema Olluwasayo
19/eng02/012
Computer Engineering
Maths 104

1.) $3te^{2t}$

let $u = 3t$

$\frac{du}{dt} = 3$ $\qquad$ $dv = e^{2t}$

$du = 3dt$ $\qquad$ $\int dv = \int e^{2t}$

$v = \frac{e^{2t}}{2}$

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

$= 3t\left(\frac{e^{2t}}{2}\right) - \int \frac{e^{2t}}{2} \times 3dt$

$3t\left(\frac{e^{2t}}{2}\right) - \frac{1}{2}\int 3e^{2t}\,dt$

$3t\left(\frac{e^{2t}}{2} - \frac{1}{2} \times \frac{3e^{2t}}{2} + c\right.$

$\left[\frac{3te^{2t}}{2} - \frac{3e^{2t}}{4}\right] + c$

2 $\int x^2 \sin x$

let $u = x^2$ and $dv = \sin x$

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

using $uv - \int v\,du$

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

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

[let $u = -2x$ and $dv = \cos x$
$du/dx = -2x$ and $v = \sin x$]

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

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

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

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

$\int x^2 \sin x = -x^2\cos x - 2x\sin x - 2\cos x + c$

3) $\int \sin 7x \cos 2x$

let $A = 7x$, $B = 2x$

$\sin 7x \cos 2x = \frac{1}{2}[\sin(7x+2x) +$

$\sin(7x-2x)]$

$\int \sin 7x \cos 2x = \frac{1}{2}[\sin 9x + \sin 5x]$

$= \frac{1}{2}\int[\frac{\sin 9x}{9} + \frac{\sin 5x}{5}]$

$= -\frac{\cos 9x}{18} - \frac{\cos 5x}{10} + c$

4 $\frac{2x-3x^2}{1-x}$

$$\begin{array}{r|l} & 2x-x^2 \\ \hline 1-x & 2x-3x^2 \\ & -2x-2x^2 \\ \hline & -x^2 \\ & -x^2+x^3 \\ \hline & -x^3 \end{array}$$

Then

$\int(2x-x^2)\,dx + \int \frac{x^3}{1-x}\,dx$

$= \frac{2x^2}{2} - \frac{x^3}{3} + x^3 \ln(1-x)$