

TADESE VICTOR ADEDAMOLA

ELECT/ELECT ENGINEERING

19/ENG04/055

MAT 104 ASSIGNMENT

1)  $\int 3te^{2t}$        $uv - \int vdu$

$u = 3t$        $dv = e^{2t}$

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

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

$= \frac{3}{2}te^{2t} - \int \frac{e^{2t}}{2} \times 3dt$

$= \frac{3te^{2t}}{2} - \frac{3}{2} \int e^{2t} dt$

$= \frac{3te^{2t}}{2} - \frac{3}{2} \left( \frac{e^{2t}}{2} \right) + C$

$= \frac{3te^{2t}}{2} - \frac{3e^{2t}}{4} + C$

2)  $\int x^2 \sin x$

$u = x^2$        $dv = \sin x$

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

$\frac{du}{dx}$

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

$\int 2x \cos x$

$u = 2x$        $dv = \cos x$

$\frac{du}{dx} = 2$        $v = \sin x$

$\frac{du}{dx}$

$= 2x \sin x - \int 2 \sin x dx$

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

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

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

$$\sin A \cos B = \frac{1}{2} [\sin(A+B) + \sin(A-B)]$$

$$= \frac{1}{2} (\sin 9x + \sin 5x)$$

$$= \frac{1}{2} \int \sin 9x + \sin 5x \, dx$$

$$= \frac{1}{2} \left( -\cos 9x/9 - \cos 5x/5 \right) + C$$

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

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

$$\begin{array}{r} 3x + 1 \\ -x + 1 \overline{) -3x^2 + 2x} \\ \underline{-3x^2 + 3x} \phantom{0} \\ -x \phantom{0} \\ \underline{-x + 1} \phantom{0} \\ -1 \phantom{0} \end{array}$$

$$= \int 3x + 1 + \int \frac{-1}{-x+1} \quad u = -x+1 \quad dx = -du$$

$$= \frac{3x^2}{2} + x + \ln |u| + C$$

$$= \frac{3x^2}{2} + x + \ln |-x+1| + C$$