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COURSE CODE: MAT104 (General Mathematics III)

### Assignment

Integrate the following with respect to their variable  
1.  $\int 3te^{2t}$

Solution

$$\int 3te^{2t} dt$$

$$3 \int te^{2t} dt$$

Recall;

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

where;

$$u = t, \quad dv = e^{2t}$$

$$du = dt, \quad \int dv = \int e^{2t}$$

$$v = \frac{1}{2} e^{2t}$$

Substitute into the equation

$$= t \cdot \frac{1}{2} e^{2t} - \int \frac{1}{2} e^{2t} dt$$

$$\begin{aligned}
 &= -x^2 \cos x + 2x \sin x - \int 2 \sin x \, dx \\
 &= -x^2 \cos x + 2x \sin x - (-2 \cos x) + C \\
 &= -x^2 \cos x + 2x \sin x + 2 \cos x + C
 \end{aligned}$$

3.  $\int \sin 7x \cos 2x \, dx$

Solution

$\int \sin a x \cos b x$

Recall,

$$\left[ \sin a - \cos b = \frac{1}{2} (\sin(a+b) + \sin(a-b)) \right]$$

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

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

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

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

4  $(2x - 3x^2)$