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$\frac{d}{q}$ 19/ENG04/1002 (Serial Number: 6)

Electrical/Electronics

1) $3te^{2t}$

$u = 3t \qquad dv = e^{2t}$

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

$du = 3dt$

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

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

2) $x^2 \sin x$

$u = x^2 \qquad dv = \sin x$

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

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

Let $u = 2x \qquad dv = \cos x$

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

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

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

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

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

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

$A = 7x \quad , \quad B = 2x$

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

$$= \frac{1}{2}\left[\sin 9x + \sin 5x\right.$$

$$\int \sin 7x \cos 2x \, dx = \frac{1}{2}\int (\sin 9x + \sin 5x)\, dx$$

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

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

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

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

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

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