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MAT 104 SN :- 207

$\cancel{= f(-11 + 14)} - j(5$

1) $\int 3te^{2t}\,dt$

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

$du = 3dt \qquad v = \frac{1}{2}e^{2t}$

$\int v\,du = uv - \int v\,du$

$= \frac{3}{2}te^{2t} - \int \frac{1}{2}e^{2t} \cdot 3dt$

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

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

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

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

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

$du = 2x\,dx \qquad v = -\cos x$

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

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

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

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

$du = 2dx \qquad v = \sin x$

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

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

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

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

$A = 7x \qquad B = 2x$

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

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

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

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

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

$= \int \frac{3x^2 + 2x}{-x + 1} dx$

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

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

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

$= \frac{3x^2 - 3x}{x}$

$= \frac{x - 1}{1}$

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

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