

$$= P(-11 + 14) - JCS$$

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

$$u = 3t$$

$$dv = e^{2t}$$

$$du = 3dt$$

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

$$\begin{aligned} \int vdu &= uv - \int vdu \\ &= \frac{3}{2}te^{2t} - \int \frac{1}{2}e^{2t} \cdot 3dt \\ &= \frac{3}{2}te^{2t} - \frac{3}{2} \int e^{2t} dt \\ &= \frac{3te^{2t}}{2} - \frac{3}{2} \left[ \frac{e^{2t}}{2} \right] + C \\ &= \frac{3te^{2t}}{2} - \frac{3e^{2t}}{4} + C \end{aligned}$$

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

$$u = x^2$$

$$dv = \sin x$$

$$du = 2x dx$$

$$v = -\cos x$$

$$\begin{aligned} \int vdu &= uv - \int vdu \\ &= x^2 \cos x - \int -2x \cos x dx \\ &= x^2 \cos x + \int 2x \cos x dx \end{aligned}$$

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

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

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

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

$$A = 7x$$

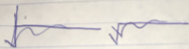
$$B = 2x$$

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

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

$$\begin{aligned} \int \sin 7x \cos 2x dx &= \int \frac{1}{2} [\sin 9x + \sin 5x] dx \\ &= \frac{1}{2} \left[ -\frac{\cos 9x}{9} - \frac{\cos 5x}{5} \right] + C \end{aligned}$$

$$\begin{aligned}
 d) \int \frac{2x - 3x^2}{1-x} dx \\
 &= \int \frac{3x^2 + 2x}{-x+1} dx \\
 &\quad \int \frac{-(3x^2 - 2x) dx}{x-1} \\
 &\quad \int \frac{3x^2 - 2x}{x-1} dx
 \end{aligned}$$



$$\begin{aligned}
 x - x \sqrt{\frac{3x+1}{3x^2-2x}} \\
 &= \frac{3x^2 - 3x}{x} \\
 &= \frac{x-1}{1}
 \end{aligned}$$

$$\begin{aligned}
 &= \int (3x+1) dx + \int \frac{1}{x-1} dx \\
 &= \frac{3x^2}{2} + x + \ln|x-1| + C
 \end{aligned}$$