Team 1

a. $\int \sin^2 x\,dx$

$= \int \frac{1-\cos 2x}{2}\,dx$

$\rightarrow = \frac{x}{2} - \frac{\sin 2x}{4} + C$

b. $\int \cos^2 x\,dx$

$= \int \frac{1+\cos 2x}{2}\,dx$

$\rightarrow = \frac{x}{2} + \frac{\sin 2x}{4} + C$

c. $\int x \sin x\,dx$

$u = x \quad dv = \sin x\,dx$

$du = dx \quad v = -\cos x\,dx$

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

$\rightarrow \sin x - x\cos x + C$

d. $\int x\cos x\,dx$

$u = x \quad dv = \cos x\,dx$

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

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

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

SubProbA

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

$u = x^2 \quad v = \frac{x}{2} - \frac{\sin 2x}{4}$

$x^2\left(\frac{x}{2} - \frac{\sin 2x}{4}\right) - \int \left(\frac{x}{2} - \frac{\sin 2x}{4}\right) 2x\,dx$

$\frac{x^3}{2} - \frac{x^2 \sin 2x}{4} - \int x^2\,dx + \int x \sin 2x\,dx$

SubProbC

$\frac{x^3}{2} - \frac{x^3}{3} - \frac{x^2 \sin 2x}{4} + \frac{\sin 2x}{8} - \frac{x\cos 2x}{4} + C$

$\frac{x^3}{6} - \frac{x^2 \sin 2x}{4} + \frac{\sin 2x}{8} - \frac{x\cos(2x)}{4} + C$