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1 $\int \cos^2(qx)\,dx$

$= \int \frac{1 + \cos(2qx)}{2}\,dx = \frac{1}{2}\left(x + \frac{1}{2q}\sin(2qx)\right) + C = \frac{x}{2} + \frac{1}{4q}\sin(2qx) + C$

2 $\int_0^{\frac{\pi}{2}} \underbrace{x}_{u} \cdot \underbrace{\cos x\,dx}_{dv}$

$= uv - \int v\,du$

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

$= x\sin x + \cos x \Big|_0^{\frac{\pi}{2}}$

$= \left(\frac{\pi}{2}(1) + 0\right) - (0 + 1)$

$= \frac{\pi}{2} - 1$

$u^2 + v^2 = 1$

$v^2 = 1 - u^2$

3 $\int 2 + 6\cos^2(x)\,dx$

$2\int \left(1 + 3\cos^2(x)\,dx\right)$

$2x + 2\int 3\cos^2 x\,dx$

$2x + 2\int \frac{3 + 3\cos 2x}{2}\,dx$

$= 2x + 3\int 1 + \cos 2x\,dx$

$= 2x + 3x + 3\left(\frac{1}{2}\sin 2x\right)$

$= 5x + \frac{3}{2}\sin 2x + C$