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4. $$I_n = \int x^n \cos x \, dx$$

(a) Show that, for $n \geqslant 2$

$$I_n = x^n \sin x + nx^{n-1} \cos x - n(n-1)I_{n-2}$$

(4)

(b) Hence find the functions $f(x)$ and $g(x)$ such that

$$\int x^4 \cos x \, dx = f(x)\sin x + g(x)\cos x + c$$

where c is an arbitrary constant.

(5)

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