

حساب التكامل الأول

ليكن x عنصرا من $[0,2]$

$$1 - |x - 1|^3 = \begin{cases} 1 - (x - 1)^3, & x \geq 1 \\ 1 - (1 - x)^3, & x \leq 1 \end{cases} \quad \text{لدينا}$$

ومنه

$$\int_0^2 (1 - |x - 1|^3) dx = \int_0^1 (1 - (1 - x)^3) dx + \int_1^2 (1 - (x - 1)^3) dx$$

لدينا

$$\begin{aligned} \int_0^1 (1 - (1 - x)^3) dx &= \int_0^1 dx + \int_0^1 -(1 - x)^3 dx \\ &= [x]_0^1 + \left[-\frac{1}{4}(1 - x)^4 \right]_0^1 \\ &= 1 - \frac{1}{4} \\ &= \frac{3}{4} \end{aligned}$$

$$\int_1^2 (1 - (x - 1)^3) dx = \int_1^2 dx - \int_1^2 (x - 1)^3 dx$$

$$= [x]_1^2 - \left[\frac{1}{4} (x-1)^4 \right]_1^2$$

$$= 1 - \frac{1}{4}$$

$$= \frac{3}{4}$$

$$\int_0^2 (1 - |x-1|^3) dx = \frac{3}{2}$$

إذن

حساب التكامل الثاني

$$I = \int_{-\frac{\pi}{2}}^0 \cos x (\sin x + \sin^3 x) dx$$

نضع

$$I = \int_{-\frac{\pi}{2}}^0 (\cos x \sin x + \cos x \sin^3 x) dx$$

لدينا

$$= \int_{-\frac{\pi}{2}}^0 \cos x \sin x dx + \int_{-\frac{\pi}{2}}^0 \cos x \sin^3 x dx$$

$$= \left[\frac{1}{2} \sin^2 x \right]_{-\frac{\pi}{2}}^0 + \left[\frac{1}{4} \sin^4 x \right]_{-\frac{\pi}{2}}^0$$

$$= -\frac{1}{2} + \left(-\frac{1}{4} \right)$$

$$= -\frac{3}{4}$$

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