

حساب التكامل I

$$\begin{aligned}
 I &= \int_1^2 \frac{x^4 - 3x^3 + 2}{x^2} dx \\
 &= \int_1^2 \left(x^2 - 3x + \frac{2}{x^2} \right) dx \\
 &= \left[\frac{1}{3} x^3 - \frac{3}{2} x^2 - \frac{2}{x} \right]_1^2 \\
 &= -\frac{7}{6}
 \end{aligned}$$

حساب التكامل J :

لدينا

$$J = \frac{1}{2} \int_{-2}^0 u'(x) \sqrt{u(x)} dx$$

$$\forall x \in \mathbb{R} \quad u(x) = x^2 + 2x + 5 \quad \text{حيث}$$

ومنه

$$J = \frac{1}{2} \left[\frac{2}{3} u^{3/2}(x) \right]_{-2}^0$$

$$= \frac{1}{3} (\sqrt{5^3} - \sqrt{5^3})$$

$$= 0$$

حساب التكامل K

$$u(x) = x + 1 \quad \text{نضع}$$

$$v(x) = -\frac{1}{2} \cos(2x + 1) \quad \text{و}$$

لدينا

$$K = \int_{-\frac{1}{2}}^{\frac{\pi-2}{4}} u(x) v'(x) dx$$

$$= [u(x) v(x)]_{-\frac{1}{2}}^{\frac{\pi-2}{4}} - \int_{-\frac{1}{2}}^{\frac{\pi-2}{4}} u'(x) v(x) dx$$

$$= [u(x) v(x)]_{-\frac{1}{2}}^{\frac{\pi-2}{4}} - \int_{-\frac{1}{2}}^{\frac{\pi-2}{4}} v(x) dx$$

$$u\left(\frac{\pi-2}{4}\right)v\left(\frac{\pi-2}{4}\right)=\left(\frac{\pi-2}{4}+1\right)\left(-\frac{1}{2}\cos\left(\frac{\pi-2}{2}+1\right)\right) \quad \text{لدينا}$$

$$=\frac{-1}{2}\cdot\frac{\pi+2}{4}\cos\frac{\pi}{2}$$

$$=0$$

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

$$K=\frac{1}{4}+\frac{1}{2}\int_{-\frac{1}{2}}^{\frac{\pi-2}{4}}\cos(2x+1)dx \quad \text{ومنه}$$

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

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

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

حساب التكامل L

$$du=\frac{1}{2}dx \quad \text{نضع } u=\frac{1}{2}(x+1) \quad \text{ويكون لدينا}$$

$$dx=2du \quad \text{أي}$$

$$x^2+2x+5=(x+1)^2+4 \quad \text{لدينا}$$

$$=4(u^2+1)$$

$$L=\int_0^1\frac{1}{4(u^2+1)}2du \quad \text{ومنه}$$

$$=\frac{1}{2}\int_0^1\frac{1}{u^2+1}du$$

$$=\frac{1}{2}[\text{Arctan } u]_0^1$$

$$=\frac{\pi}{8}$$

