

$$I = \int_0^1 \frac{1}{(x+1)^2} \sqrt{\frac{x}{x+1}} dx \quad \text{1- حساب}$$

$$I = \int_0^1 \left(\frac{x}{x+1} \right)' \left(\frac{x}{x+1} \right)^{\frac{1}{2}} dx \quad \text{لدينا :}$$

$$\begin{aligned} &= \left[\frac{2}{3} \left(\frac{x}{x+1} \right)^{\frac{3}{2}} \right]_0^1 = \frac{2}{3} \left[\sqrt{\left(\frac{x}{x+1} \right)^3} \right]_0^1 \\ &= \frac{2}{3} \sqrt{\left(\frac{1}{2} \right)^3} = \frac{2}{3} \cdot \frac{1}{2} \cdot \sqrt{\frac{1}{2}} = \frac{1}{3} \cdot \frac{\sqrt{2}}{2} \\ I &= \frac{\sqrt{2}}{6} \quad \text{إذن :} \end{aligned}$$

$$J = \int_{-1}^0 \frac{1}{1 + \sqrt[3]{x+1}} dx \quad \text{2- حساب}$$

$$\begin{aligned} \sqrt[3]{x+1} &= t-1 & \text{نضع :} & t = 1 + \sqrt[3]{x+1} \\ x &= t^3 - 3t^2 + 3t - 1 - 1 & \text{ومنه :} & x+1 = (t-1)^3 \\ & & \text{أي :} & x = t^3 - 3t^2 + 3t - 2 \end{aligned}$$

$$dx = (3t^2 - 6t + 3) dt \quad \text{وبالتالي :}$$

$$t = 1 \quad \text{لدينا :} \quad x = -1 \quad \text{من أجل}$$

$$t = 2 \quad \text{لدينا :} \quad x = 0 \quad \text{ومن أجل}$$

$$J = \int_1^2 \frac{(3t^2 - 6t + 3) dt}{t} \quad \text{إذن :}$$

$$= \int_1^2 \left(3t - 6 + \frac{3}{t} \right) dt = \left[\frac{3t^2}{2} - 6t + 3 \ln t \right]_1^2$$

$$= 6 - 12 + 3 \ln 2 - \frac{3}{2} + 6 - 0$$

$$J = -\frac{3}{2} + 3 \ln 2 \quad \text{وبالتالي فإن :}$$

$$K = \int_0^{\frac{\pi}{2}} \cos x \cdot \ln(1 + \cos x) dx \quad \text{3- حساب}$$

$$V' = \cos x \quad \text{و} \quad U = \ln(1 + \cos x) \quad \text{نضع :}$$

$$V = \sin x \quad , \quad U' = \frac{-\sin x}{1 + \cos x}$$

$$K = [\sin x \ln(1 + \cos x)]_0^{\frac{\pi}{2}} + \int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{1 + \cos x} dx \quad \text{إذن :}$$

$$= 0 + \int_0^{\frac{\pi}{2}} \frac{1 - \cos^2 x}{1 + \cos x} dx = \int_0^{\frac{\pi}{2}} \frac{(1 + \cos x)(1 - \cos x)}{1 + \cos x} dx$$

$$= \int_0^{\frac{\pi}{2}} (1 - \cos x) dx = [x - \sin x]_0^{\frac{\pi}{2}} = \frac{\pi}{2} - 1 - 0 + 0$$

$$k = \frac{\pi}{2} - 1 \quad \text{وبالتالي فإن :}$$



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