

1- تحديد H دالة أصلية للدالة h

$$h(t) = \frac{1}{(t+2)^2} = \frac{(t+2)'}{(t+2)^2} \quad \text{لكل } x \text{ من } \mathbb{R}^+ \text{ ، لدينا :}$$

$$\text{إذن : } H(t) = \frac{-1}{t+2} \quad \text{لكل } t \text{ من } \mathbb{R}^+$$

2- لنبين أن : $\int_0^\alpha t e^t dt = \alpha e^\alpha - e^\alpha + 1$ لكل t من $\mathbb{R}^{++}$

$$\text{نضع : } U(t) = t \quad \text{و} \quad V'(t) = e^t$$

$$V(t) = e^t, \quad U'(t) = 1$$

$$\int_0^\alpha t e^t dt = [t e^t]_0^\alpha - \int_0^\alpha e^t dt \quad \text{إذن :}$$

$$= \alpha e^\alpha - [e^t]_0^\alpha$$

$$= \alpha e^\alpha - (e^\alpha - 1)$$

$$\int_0^\alpha t e^t dt = \alpha e^\alpha - e^\alpha + 1 \quad \text{وبالتالي :}$$

$$I(\alpha) = \int_0^\alpha \frac{t^2 e^t}{(t+2)^2} dt \quad \text{3- حساب}$$

$$\text{نضع : } H'(t) = \frac{1}{(t+2)^2} \quad \text{و} \quad g(t) = t^2 e^t$$

$$g'(t) = 2t e^t + t^2 e^t = t e^t (t+2), \quad H(t) = \frac{-1}{t+2}$$

$$I(\alpha) = \left[\frac{-t^2 e^t}{t+2} \right]_0^\alpha + \int_0^\alpha \frac{t e^t (t+2)}{t+2} dt \quad \text{إذن :}$$

$$= \frac{-\alpha^2 e^\alpha}{\alpha+2} + \int_0^\alpha t e^t dt = \frac{-\alpha^2 e^\alpha}{\alpha+2} + \alpha e^\alpha - e^\alpha + 1$$

$$= \left(\frac{-\alpha^2}{\alpha+2} + \alpha - 1 \right) e^\alpha + 1 = \left(\frac{-\alpha^2 + \alpha^2 + 2\alpha - \alpha - 2}{\alpha+2} \right) e^\alpha + 1$$

$$I(\alpha) = \frac{\alpha-2}{\alpha+2} e^\alpha + 1 \quad \text{وبالتالي :}$$

$$J = \int_1^e \frac{(\ln x)^2}{(2 + \ln x)^2} dx \quad \text{-4 حساب}$$

$$x = e^t \quad \text{نضع :} \quad t = \ln x \quad \text{إذن :}$$

$$dx = e^t dt \quad \text{ومنه :}$$

$$t = \ln 1 = 0 \quad \text{لدينا :} \quad x = 1 \quad \text{من أجل}$$

$$t = \ln e = 1 \quad \text{لدينا :} \quad x = 2 \quad \text{ومن أجل}$$

$$J = \int_0^1 \frac{t^2 \cdot e^t}{(2+t)^2} dt \quad \text{إذن :}$$

$$= I(1) = \frac{1-2}{1+2} e^1 + 1$$

$$J = 1 - \frac{e}{3} \quad \text{وبالتالي :}$$



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