

$$\begin{aligned}
 I &= \int_0^2 (1 - |1 - t|)^3 dt \quad (1) \\
 &= \int_0^2 (1 - (1 - t))^3 dt + \int_0^2 (1 - (t - 1))^3 dt \\
 &= \int_0^2 t^3 dt + \int_0^2 (2 - t)^3 dt \\
 &= \left[\frac{1}{4} t^4 \right]_0^1 + \left[-\frac{1}{4} (2 - t)^4 \right]_1^2
 \end{aligned}$$

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

إذن

$$\begin{aligned}
 &= \int_0^4 \left[2 - \frac{2(x - 3)}{|x - 3| + 3} \right] dx \quad (2) \\
 &= \int_0^3 2 - \frac{2(x - 3)}{3 - x + 3} dx + \int_3^4 \left[2 - \frac{2(x - 3)}{x - 3 + 3} \right] dx \\
 &= \int_0^3 \frac{18 - 4x}{6 - x} dx + \int_3^4 \frac{6}{x} dx \\
 &= \int_0^3 \left(4 - \frac{6}{6 - x} \right) dx + \int_3^4 \frac{6}{x} dx \\
 &= [4x + 6 \ln(6 - x)]_0^3 + [6 \ln x]_3^4
 \end{aligned}$$

$$J = 12 + 6 \ln\left(\frac{2}{3}\right)$$

إذن

إعداد الأستاذ : محمد أنفلوس