

~~قانون التكامل بالتجزئة~~

$$\int x \ln x \, dx = \int u \, dv = uv - \int v \, du$$

$$= \ln x \cdot \frac{x^2}{2} - \int \frac{x^2}{2} \cdot \frac{1}{x} \, dx$$

$$= \frac{x^2}{2} \ln x - \frac{1}{2} \int x \, dx$$

$$\therefore \int x \ln x \, dx = \frac{x^2}{2} \ln x - \frac{1}{4} x^2 + c$$

② ~~(a) $\int \ln(2x+3) \, dx$~~ (دالة عادية) (b) $\int \ln x \, dx$ (ch.)

$$u = \ln(2x+3) \quad dv = dx$$

$$du = \frac{2 \, dx}{2x+3} \quad v = \int dv = \int dx = x$$

$$\therefore \int \ln(2x+3) \, dx = \int u \, dv = uv - \int v \, du$$

$$= \ln(2x+3) \cdot x - \int x \cdot \frac{2}{2x+3} \, dx$$

$$= x \ln(2x+3) - \int \frac{2x \, dx}{2x+3}$$

$$= x \ln(2x+3) - \int \frac{(2x+3-3) \, dx}{2x+3}$$

$$= x \ln(2x+3) - \int \frac{2x+3}{2x+3} \, dx + \int \frac{3 \, dx}{2x+3}$$

$$= x \ln(2x+3) - \int dx + 3 \int \frac{dx}{2x+3}$$

$$= x \ln(2x+3) - x + \frac{3}{2} \int \frac{2 \, dx}{2x+3}$$

$$\therefore \int \ln(2x+3) \, dx = x \ln(2x+3) - x + \frac{3}{2} \ln|2x+3| + c$$