

$$\int x \log(1+x) dx$$

$$= \int \left(\frac{x^2}{2}\right)' \log(1+x) dx$$

$$= \frac{x^2}{2} \log(1+x) - \int \frac{x^2}{2} \times \frac{1}{1+x} dx$$

$$= \frac{x^2}{2} \log(1+x) - \frac{1}{2} \int \frac{(x+1)(x-1)+1}{x+1} dx$$

$$= \frac{x^2}{2} \log(1+x) - \frac{1}{2} \int \left\{ (x-1) + \frac{1}{x+1} \right\} dx$$

$$= \frac{x^2}{2} \log(1+x) - \frac{1}{4} (x-1)^2 - \frac{1}{2} \log(1+x) + C$$

$$= \left[\frac{1}{2} (x^2-1) \log(1+x) - \frac{1}{4} (x-1)^2 + C \right] \quad (C \text{ は積分定数})$$

$$\begin{array}{r} x-1 \\ x+1 \overline{) x^2} \\ \underline{x^2+x} \\ -x-1 \\ \underline{1} \end{array}$$

811 例7 $\int x \log(1+x) dx$

$$= \int \left(\frac{x^2-1}{2}\right)' \log(1+x) dx$$

$$= \frac{1}{2} (x^2-1) \log(1+x) - \int \frac{x^2-1}{2} \times \frac{1}{x+1} dx$$

$$= \frac{1}{2} (x^2-1) \log(1+x) - \frac{1}{2} \int (x-1) dx$$

$$= \left[\frac{1}{2} (x^2-1) \log(1+x) - \frac{1}{4} (x-1)^2 + C \right] \quad (C \text{ は積分定数})$$