

Typo:  $\sqrt{t}$ .

①  $\int \sin^2 \frac{\pi}{a+t} dt$

$$x = a + t \Rightarrow t = x - a$$

$$dx = dt \cdot \tan^2 \theta \cdot d\theta$$

$$= \int \sin^2 \frac{\pi \tan^2 \theta}{a + x - a} \cdot \underline{2a \cdot \tan \theta \cdot d\theta} \cdot d\theta$$

$$= 2a \int \sin^2 \frac{\tan^2 \theta}{x} \cdot \underline{\text{band. d}\theta} \cdot d\theta$$

$$= 2a \int \sin^2 (\text{band. band. } \tan^2 \theta) d\theta$$

$$= 2a \int \underset{\text{I}}{\theta} \cdot \underset{\text{II}}{\text{band. band. band. band.}}$$

$$= 2a \int \theta \cdot \text{standard. band. } d\theta - \int \int \text{band. standard. band. } d\theta$$

(standard. band)

$$\text{band} = t$$

$$\text{standard. band} = dt$$

$$\int t dt = \frac{t^2}{2}$$

$$= \frac{t^2}{2}$$

$$= 2a \left[ \theta \cdot \frac{\tan^2 \theta}{2} - \int 1 \cdot \frac{\tan^2 \theta}{2} dt \right]$$

$$= a \cdot \theta \cdot \tan^2 \theta - a \int \tan^2 \theta \cdot dt$$

$$= a \cdot \theta \cdot \tan^2 \theta - a \cdot \int (\tan^2 \theta - 1) dt$$

$$= a \cdot \theta \cdot \tan^2 \theta - a \cdot \tan \theta + a \cdot \theta + C$$

$$= a \cdot \tan^{-1} \sqrt{\frac{x}{a}} \cdot \frac{x}{a} - a \cdot \sqrt{\frac{x}{a}} + a \cdot \tan^{-1} \sqrt{\frac{x}{a}} + C$$

$$= x \cdot \tan^{-1} \sqrt{\frac{x}{a}} + a \cdot \tan^{-1} \sqrt{\frac{x}{a}} - \sqrt{ax} + C$$

$$= (x+a) \tan^{-1} \sqrt{\frac{x}{a}} - \sqrt{ax} + C$$

Type. VII

$$\textcircled{2} \int e^x (\log \sin x + \cot x) dx$$

$$= \int e^x \log \sin x dx + \int e^x \cdot \cot x dx$$

$$= \int e^x \cdot \log \sin x dx + \overset{I}{e^x} \int \cot x dx$$

$$- \int [d_{dx}(e^x) \cdot f(\cot x)] dx$$

$$= \cancel{\int e^x \cdot \log \sin x dx} + e^x \cdot \log \sin x - \int e^x \cdot \log \sin x dx$$

$$= e^x \cdot \log \sin x + C$$

Works:

$$\textcircled{1} \int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$$

$$\textcircled{2} \int \frac{x^2 \tan x}{1+x^2} dx$$

$$\textcircled{3} \int \log \left( \frac{1+x}{1-x} \right) dx$$

$$\textcircled{4} \int \tan^{-1} \left[ \frac{a-x}{ax} \right] dx$$

$$\textcircled{5} \int \left\{ \frac{1}{\log x} - \frac{1}{(\log x)^2} \right\} dx$$