

Si  $F(x)$  est une primitive de  $f(x)$ , on a

$$F(x) = \int f(x) dx \iff f(x) = \frac{d}{dx} F(x)$$

si on pose  $\boxed{x = g(t)}$ , alors

$$\frac{d}{dx} F(g(t)) = f(g(t)) \cdot g'(t) \iff \int f(g(t)) \cdot g'(t) dt = F(g(t)) + C$$

On a donc

$$\boxed{\int f(x) dx = \int f(g(t)) \cdot g'(t) dt}$$

Ex:

$$\begin{aligned} \int \frac{1}{\sqrt{x+1}} dx &\Rightarrow t = \sqrt{x}, \quad x = t^2, \quad dx = 2t dt \\ \Rightarrow \int \frac{1}{\sqrt{x+1}} dx &= \int \frac{1}{t^2+1} \cdot 2t dt = 2 \int \frac{t}{t^2+1} dt \\ &= 2 \int \left(1 + \frac{-1}{t^2+1}\right) dt = 2 \cdot (t - \ln(t^2+1)) + C \end{aligned}$$