Corollary: If $f:[a,b]\to\mathbb{R}$ is continuous, then f has an antiderivative

① ②

substitution: $x = g(y)$

① $\int_{g(c)}^{g(d)} f(x)\,dx = F(g(d)) - F(g(c))$

② Take $\frac{d}{dy}(F(g(y))) \xrightarrow{\text{chain rule}} = F'(g(y))\cdot g'(y) = f(g(y))\cdot g'(y)$

↳ $\int_c^d \boxed{f(g(y))\,g'(y)}\,dy = F(g(d)) - F(g(c)) = ①$ ∎

↳ integrable ?

① $f, g : [a,b]\to\mathbb{R}$ are integrable $\Rightarrow$ $f\cdot g : [a,b]\to\mathbb{R}$ is integrable

② $f:[a,b]\to\mathbb{R}$ is integrable & $h:[c,d]\to\mathbb{R}$ is cont.

$\Rightarrow h\circ f$ is integrable

(*)

$\boxed{}$

<u>Antiderivative</u>:

$F'(x) = f(x)$

chain rule