③ Common functions?

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

$\Rightarrow \int f(x)\,dx = F(x)$.

- $\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$, $n \neq -1$

$\frac{d}{dx}x^m = m x^{m-1}$

$\Rightarrow \frac{d}{dx}\frac{x^m}{m} = x^{m-1}$, $m \neq 0$

$\Rightarrow \frac{d}{dx}\left(\frac{x^{n+1}}{n+1}\right) = x^n$, $n \neq -1$

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

$\frac{d}{dx}\ln x = \frac{1}{x} \Rightarrow \int \frac{1}{x}\,dx = \ln x + C$, $x > 0$. $\longrightarrow \int \frac{1}{x}\,dx = \ln|x| + C''$

$x < 0$?

$\int \frac{1}{x}\,dx$, $x < 0$?

$-x > 0$.

$\frac{d}{dx}(\ln(-x)) = \frac{1}{x}$.

$\int \frac{1}{x}\,dx = \ln(-x) + C'$, $x < 0$.

- $\int \sin x\,dx$?

$\frac{d}{dx}\sin x = \cos x$ $\Rightarrow \int \sin x\,dx = -\cos x + C$

$\frac{d}{dx}\cos x = -\sin x$ $\Rightarrow \int \cos x\,dx = \sin x + C'$

$\frac{d}{dx}\tan x = \sec^2 x$ $\Rightarrow \int \sec^2 x\,dx = \tan x + C''$

- $\int e^x\,dx = e^x + C$.

$\frac{d}{dx}e^x = e^x$