f	f'
$\frac{d}{dx}\sin x$	$= \cos x$
$\frac{d}{dx}\cos x$	$= -\sin x$
$\frac{d}{dx}\tan x$	$= \sec^2 x$
$\frac{d}{dx}\cot x$	$= -\csc^2 x$
$\frac{d}{dx}\sec x$	$= \sec x \tan x$
$\frac{d}{dx}\csc x$	$= -\csc x \cot x$

100K

$$\int \sin x\, dx = -\cos x + C$$

$$\int \sin kx\, dx = \frac{-\cos kx}{k} + C$$

$$\int \cos x\, dx = \sin x + C$$

$$\int \cos kx\, dx = \frac{\sin kx}{k} + C$$

$$\int \sec^2 x\, dx = \tan x + C$$

$$\int \csc^2 x\, dx = -\cot x + C$$

$$\int \sec x \tan x\, dx = \sec x + C$$

$$\int \csc x \cot x\, dx = -\csc x + C$$

5-3 تكامل الدوال المثلثية

① $\int (\sec x \tan x + \sin x)\, dx$

$= \sec x - \cos x + C$

② $\int (\csc x \cot x + \sec^2 x)\, dx$

$= -\csc x + \tan x + C$

③ $\int \left(\frac{-1}{x^2} + 5\sin 3x\right) dx = \frac{1}{x} - \frac{5}{3}\cos 3x + C$

④ $\int \sin^4 x \cos x\, dx$

$u = \sin x$

$du = \cos x\, dx$

$= \int u^4\, du$

$= \frac{u^5}{5} + C = \frac{\cos^5 x}{5} + C$

⑤ $\int \cos^5 x \sin x\, dx$

$u = \cos x$

$du = -\sin x\, dx$

$= -\int u^5\, du = -\frac{u^6}{6} + C$

$= -\frac{\cos^6 x}{6} + C$

⑥ $\int x^2 \sin(x^3+1)\,dx$

$u = x^3+1$

$du = 3x^2\,dx$

$= \frac{1}{3}\int \sin(x^3+1)\,3x^2\,dx$

$= \frac{1}{3}\int \sin u\,du = \frac{1}{3}\cos u + c = \frac{1}{3}\cos(x^3+1)+c$

⑦ $\int \frac{\sin x}{\cos^3 x}\,dx = -\int \cos^{-3} x\,(-\sin x)\,dx$

$u = \cos x$

$du = -\sin x\,dx$

$= -\int u^{-3}\,du = -\frac{u^{-2}}{-2} + c = \frac{1}{2u^2} + c$

$= \frac{1}{2\cos^2 x} + c$

⑧ $\int \sec^3 x \tan x\,dx$

$= \int \sec^2 x \sec x \tan x\,dx$

$u = \sec x$

$du = \sec x \tan x\,dx$

$= \int u^2\,du = \frac{u^3}{3} + C$

$= \frac{1}{3}\sec^3 x + c$

(9) $\int \csc^3 x \cot x \, dx = -\int \csc^2 x (-\csc x) \cot x \, dx$

$u = \csc x$

$du = -\csc x \cot x \, dx$

$= -\int u^2 \, du = -\frac{u^3}{3} + c$

$= \frac{-1}{3} \csc^3 x + c$

(10) $\int \sqrt{\cot x} \csc^2 x \, dx$

$= -\int (\cot x)^{\frac{1}{2}} (-\csc^2 x) \, dx$

$u = \cot x$

$du = -\csc^2 x \, dx$

$= -\int u^{\frac{1}{2}} \, du = -\frac{2}{3} u^{\frac{3}{2}} + c$

$= -\frac{2}{3} \sqrt{\cot^3 x} + c$

(11) $\int \sqrt{\tan x} \sec^2 x \, dx = \int (\tan x)^{\frac{1}{2}} \sec^2 x \, dx$

$u = \tan x$

$du = \sec^2 x \, dx$

$= \int u^{\frac{1}{2}} \, du = \frac{2}{3} u^{\frac{3}{2}} + c$

$= \frac{2}{3} \sqrt{\tan^3 x} + c$

(12) $\int \sqrt{1+\sin x}\cos x\,dx$

$= \int (1+\sin x)^{\frac{1}{2}} \cos x\,dx$ $\quad u = 1+\sin x$

$du = \cos x\,dx$

$= \int u^{\frac{1}{2}}\,du = \frac{2}{3}u^{\frac{3}{2}} + C$

$= \frac{2}{3}\sqrt{(1+\sin x)^3} + C$

(13) $\int \frac{dx}{(\sin^2 x)\sqrt{1+\cot x}}$

$= -\int -\csc^2 x\,(1+\cot x)^{-\frac{1}{2}}\,dx$ $\quad u = 1+\cot x$

$du = -\csc^2 x\,dx$

$= -\int u^{-\frac{1}{2}}\,du = -2u^{\frac{1}{2}} + C$

$= -2(1+\cot x)^{\frac{1}{2}} + C = -2\sqrt{1+\cot x} + C$

(14) $\int \frac{dx}{(\cos^2 x)\sqrt{1+\tan x}} = \int \sec^2 x\,(1+\tan x)^{-\frac{1}{2}}\,dx$

$u = 1+\tan x$

$du = \sec^2 x\,dx$

$= \int u^{-\frac{1}{2}}\,du$

$= 2u^{\frac{1}{2}} + C$

$= 2\sqrt{1+\tan x} + C$