More on Antidifferentiation and Substitution

$$\int \left(x^2 - 6x + 9\right)^{1/3} dx$$

$$= \int \left[(x-3)^2\right]^{1/3} dx$$

$$= \int (x-3)^{2/3} dx$$

$$= \frac{3}{5}(x-3)^{5/3} + C$$

$$\int \frac{x^2+5x+6}{x+3} dx = \int (x+2)\, dx$$

Rational Funct → °N is bigger °D by 1.

$$\int \frac{x^2+5x-3}{x-4}\,dx$$

4)

1	5	−3
	4	36
1	9	33

$x+9+\frac{33}{x-4}$

$$= \int \left(x+9+\frac{33}{x-4}\right)dx$$

$$= \frac{1}{2}x^2+9x+33\ln|x-4|+C$$

$$\int \left(x + 3 - \frac{15}{2x+1} \right) dx$$

$$= \frac{1}{2}x^2 + 3x - \frac{15}{2} \ln|2x+1| + C$$

$$\int \tan x\,dx = \int \frac{\sin x}{\cos x}\,dx$$

$2\ln x = \ln x^2$

~~$u = \sin x$~~ $\quad u = \cos x$

~~$du = \cos x\,dx$~~ $\quad du = -\sin x\,dx$

$-du = \sin x\,dx$

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

$$= -\ln|u| + C$$

$$= \ln|u^{-1}| + C = \ln|\sec x| + C$$

$$\int \tan u\,du = \ln|\sec u| + C$$

$$\int \cot x \, dx = \int \frac{\cos x}{\sin x} \, dx$$

$u = \sin x$

$du = \cos x \, dx$

$$= \int \frac{1}{u} \, du = \ln|u| + C$$

$$= \ln|\sin x| + C$$

$$\int \cot u \, du = \ln|\sin u| + C \qquad \frac{1}{\csc u}$$

$$\int \sec x \, dx = \int \frac{\sec x (\sec x + \tan x)}{\sec x + \tan x} \, dx$$

$$u = \sec x + \tan x$$

$$du = (\sec x \tan x + \sec^2 x) \, dx$$

$$= \int \frac{1}{u} \, du = \ln|u| + C$$

$$= \ln|\sec x + \tan x| + C$$

$$\int \sec u \, du = \ln|\sec u + \tan u| + C$$

$$\int \csc u \, du = \ln|\csc u - \cot u| + C.$$

$$\int 3x \tan x^2 \, dx$$

$u = x^2$

$du = 2x \, dx$

$\frac{1}{2} du = x \, dx$

$$\frac{3}{2} \int \tan u \, du$$

$$= \frac{3}{2} \ln |\sec u| + C$$

$$= \frac{3}{2} \ln |\sec x^2| + C.$$

$$\int \cot(8x - 3) \, dx$$

$$= -\frac{1}{8} \ln |\sin(8x - 3)| + C$$