Integration

1. Antiderivatives or Reversing the process of *Differentiation*

C`(x) = 100 $\xrightarrow{\textit{Integration}}$ C(x) = 100x

C(x) = 100x + 500

C(x) = 100x + 1000

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C(x) = 100x + k *where k is a constant*

2. Notation of Antiderivative

Antiderivatives of f :

$$\underbrace{\int}_{\textbf{Integral sign}} \quad \underbrace{f'(x)}_{\textbf{integrand}} \quad \underbrace{dx}_{\textbf{differential}} \quad = \quad f(x) + k$$

where k is constant of integration

3.

Differentiation Rule	***Integration Rule***
$\frac{d}{dx}(ax) = a$	$\int a\,dx = ax + c$
$\frac{d}{dx}(x^n) = nx^{n-1}$	$\int x^n dx = \frac{x^{n+1}}{n+1} + c$
$\frac{d}{dx}(\cos x) = \sin x$	$\int \sin x\,dx = -\cos x + c$
$\frac{d}{dx}(\sin x) = \cos x$	$\int \cos x\,dx = \sin x + c$
$\frac{d}{dx}(\tan x) = \sec^2 x$	$\int \sec^2 x\,dx = \tan x + c$
$\frac{d}{dx}(\cot x) = -\csc^2 x$	$\int \csc^2 x\,dx = -\cot x + c$
$\frac{d}{dx}(\sec x) = \sec x \tan x$	$\int \sec x \tan x\,dx = \sec x + c$
$\frac{d}{dx}(\csc x) = -\csc x \cot x$	$\int \csc x \cot x\,dx = -\csc x + c$