Integration

1.   Basic integration rules:

   a. $\int k\,dx = kx + C$

   b.   Power Rule: $\int x^n\,dx = \dfrac{x^{n+1}}{n+1} + C = \dfrac{1}{n+1}x^{n+1} + C, \qquad n \neq -1$

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

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

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

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

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

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

   i.   Constant Rule: A constant can be factored out of an integral.

   $\int k\,f(x)\,dx = k\int f(x)\,dx$

   j.   Sum and Difference Rule: Integrate one term at a time.

   $\int [f(x) \pm g(x)]\,dx = \int f(x)\,dx \pm \int g(x)\,dx$

2.   Examples:

Function	Rewrite	Integrate
a. $\int x^5 \, dx$		$\frac{1}{6} x^6 + C$
b. $\int \frac{1}{x^5} \, dx$	$\int x^{-5} \, dx$	$\frac{x^{-4}}{-4} + C = -\frac{1}{4x^4} + C$
c. $\int \sqrt[5]{x} \, dx$	$\int x^{\frac{1}{5}} \, dx$	$\frac{x^{\frac{6}{5}}}{\frac{6}{5}} + C = \frac{5}{6} x^{\frac{6}{5}} + C$
d. $\int (2 \sin x - 5 \sec^2 x) \, dx$	$2 \int \sin x \, dx - 5 \int \sec^2 x \, dx$	$2(-\cos x) - 5(\tan x) + C$ $= -2 \cos x - 5 \tan x + C$
e. $\int (3x^4 - 5x^2 + 1) \, dx$	$3 \int x^4 \, dx - 5 \int x^2 \, dx + \int dx$	$\frac{3}{5} x^5 - \frac{5}{3} x^3 + x + C$