

SOME IMPORTANT INTEGRALS

$$(i) \int \frac{1}{x^2 - a^2} dx = \frac{1}{2a} \log \left| \frac{x-a}{x+a} \right| + C$$

$$(ii) \int \frac{1}{a^2 - x^2} dx = \frac{1}{2a} \log \left| \frac{a+x}{a-x} \right| + C$$

$$(iii) \int \frac{1}{\sqrt{x^2 - a^2}} dx = \log \left| x + \sqrt{x^2 - a^2} \right| + C$$

$$(iv) \int \frac{1}{\sqrt{x^2 + a^2}} dx = \log \left| x + \sqrt{x^2 + a^2} \right| + C$$

$$(v) \int \sqrt{x^2 - a^2} dx = \frac{x}{2} \sqrt{x^2 - a^2} - \frac{a^2}{2} \log \left| x + \sqrt{x^2 - a^2} \right| + C$$

$$(vi) \int \sqrt{x^2 + a^2} dx = \frac{x}{2} \sqrt{x^2 + a^2} + \frac{a^2}{2} \log \left| x + \sqrt{x^2 + a^2} \right| + C$$

$$(vii) \int \sqrt{a^2 - x^2} dx = \frac{x}{2} \sqrt{a^2 - x^2} + \frac{a^2}{2} \sin^{-1} \frac{x}{a} + C$$

Here $f_1(x)$ is the first function and $f_2(x)$ is the second function,
where the first function and second function are chosen
according to the **ILATE Rule**.

Here, I refers to Inverse Trigonometric Function

L refers to Logarithmic Function

A refers to Algebraic Function

T refers to Trigonometric Function

E refers to Exponential Function

4. Rule to Integrate

$$\int \frac{1}{a \sin^2 x + b \cos^2 x} dx, \int \frac{1}{a + b \cos^2 x} dx \text{ etc.}$$

- (i) Divide the numerator and denominator by $\cos^2 x$.
- (ii) Replace $\sec^2 x$, if any, in the denominator, by

$$1 + \tan^2 x. \text{ Put } \tan x = t \text{ so that } \sec^2 x dx = dt.$$