

# Integration

# Integration

- Integration is the backward process of differentiation

If

$$F'(x) = f(x)$$

$$\textit{then } \int f(x)dx = F(x) + C$$

# Rules of Integration

- **Power Rule**
- **Constant Multiple Rule**
- **Sum Rule**

# Power Rule

$$\bullet \int x^n dx = \frac{x^{n+1}}{n+1} + C ,$$

Where C is an arbitrary constant

$$\begin{aligned} \bullet \text{ Ex: Find } \int x^3 dx \\ &= \frac{x^{3+1}}{3+1} + C \\ &= \frac{x^4}{4} + C \end{aligned}$$

# Integrate the followings

- $\int \mathbf{x^5 dx}$

- $\int \mathbf{x^{-4} dx}$

- $\int \frac{1}{\mathbf{x^3}} \mathbf{dx}$

- $\int \sqrt{\mathbf{x}} \mathbf{dx}$

# Constant Multiple Rule

- $\int K f(x)dx = K \int f(x)dx$

K is a Constant.

Ex:-  $\int 3x^5 dx$

$$= 3 \int x^5 dx$$
$$= \frac{3x^6}{6} + C$$
$$= \frac{x^6}{2} + C$$

## *Sum Rule*

- $\int f(x) \pm g(x) dx = \int f(x) dx \pm \int g(x) dx$

**Ex:**

**Find,  $\int 4x^3 + 3x^2 - 5x + 7 dx$**

The End