

**Dr.SNS RAJALAKSHMI COLLEGE OF ARTS AND SCIENCE
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Coimbatore- 49**



DEPARTMENT OF MATHEMATICS

**21UCR304: BUSINESS CALCULUS AND FINANCIAL
COMPUTATION**

ELEMENTARY INTEGRAL CALCULUS

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Definition

- Integral is the reverse process of differentiation.
- It represents accumulated quantity such as area, distance, or total change.

General Form

- $\int f(x) dx = F(x) + C$
(where $F'(x) = f(x)$)

1. Indefinite Integral

- No limits
- Produces a family of functions

2. Definite Integral

- Has limits a to b
- Gives a numerical value
- Represents area under a curve

1. Power Rule

- $\int x^n dx = x^{n+1} / (n+1) + C$

2. Constant Rule

- $\int k dx = kx + C$

3. Sum Rule

- $\int [f(x) + g(x)] dx = \int f(x) dx + \int g(x) dx$

4. Difference Rule

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

Common Results

- $\int 1/x \, dx = \ln|x| + C$
- $\int e^x \, dx = e^x + C$
- $\int a^x \, dx = a^x / \ln(a) + C$
- $\int \sin(x) \, dx = -\cos(x) + C$
- $\int \cos(x) \, dx = \sin(x) + C$

Definition

$$\int \text{from } a \text{ to } b f(x) dx = F(b) - F(a)$$

Properties

- If $a = b \rightarrow$ value is 0
- If $a > b \rightarrow$ integral becomes negative
- $\int \text{from } a \text{ to } b (f(x) + g(x)) dx = \int f(x) dx + \int g(x) dx$

Evaluate

$$\int (3x^2 + 5x + 2) dx$$

Solution

Step 1: Integrate term by term

- $\int 3x^2 dx = x^3$
- $\int 5x dx = (5x^2)/2$
- $\int 2 dx = 2x$

Step 2: Combine

$$\text{Answer} = x^3 + (5x^2)/2 + 2x + C$$

THANK YOU