

Algebraic (Problem) Transformation

Form $\rightarrow$ $\int \frac{dx}{\sqrt{ax+b} \pm \sqrt{cx+d}}$

Problem (1)

$$\int \frac{dx}{\sqrt{5-3x} + \sqrt{4-3x}}$$

$$= \int \frac{\sqrt{5-3x} - \sqrt{4-3x}}{5-3x - 4 + 3x} dx$$

$$= \int (5-3x)^{\frac{1}{2}} dx - \int (4-3x)^{\frac{1}{2}} dx$$

using $\int (ax+b)^n dx = \frac{(ax+b)^{n+1}}{a(n+1)}$

$$= \frac{(5-3x)^{\frac{1}{2}+1}}{(\frac{1}{2}+1)(-3)} - \frac{(4-3x)^{\frac{1}{2}+1}}{(\frac{1}{2}+1)(-3)}$$

$$= -\frac{2}{3} \frac{(5-3x)^{3/2}}{3} + \frac{2}{3} \frac{(4-3x)^{3/2}}{3}$$

$$= -\frac{2}{9} [5-3x]^{3/2} + \frac{2}{9} [4-3x]^{3/2} + C$$

Algebraic Standard Integral $\rightarrow$

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

$$\int \frac{1}{x} dx = \log|x|$$

$$\int (ax+b)^n dx = \frac{(ax+b)^{n+1}}{a(n+1)}$$

$$\int \frac{1}{ax+b} dx = \frac{1}{a} \log|ax+b|$$

$$\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1}x$$

$$\int \frac{1}{1+x^2} dx = \tan^{-1}x$$

$$\int \frac{1}{x\sqrt{x^2-1}} dx = \sec^{-1}x$$

Form $\rightarrow \int f(x) [g(x)]^n dx$

When $g(x)$ is in standard form

Method $\rightarrow$ Say

$$f(x) = A g(x) + B$$

$$\therefore f(x) [g(x)]^n = [A g(x) + B] [g(x)]^n$$

$$= A [g(x)]^{n+1} + B [g(x)]^n$$

$$\therefore \int f(x) [g(x)]^n dx = A \int [g(x)]^{n+1} dx + B \int [g(x)]^n dx$$

Name of College - S.C. College
T-304

Dept - Mathematics

Topic - Integration

by Method of Transformation

Date - 24-09-2021

By Samrendra Kumar

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Name of College - C.S. College
T-1304

Dept - Mathematics

Topic - Integration

by Method of Substitution

Date - 25-09-2021

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