MORE PROPERTIES OF DEFINITE INTEGRAL

SUBJECT : MATHEMATICS
CHAPTER NUMBER:7
CHAPTER NAME :INTEGRALS

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More Properties of Definite Integral

Some important properties which will be useful in evaluating the definite integrals are given below.

(d) $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx$

(e) $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ (Particular case of property 4)

(f) $\int_0^{2a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx, & \text{if } f(2a-x) = f(x) \\ 0, & \text{if } f(2a-x) = -f(x) \end{cases}$

(g) $\int_{-a}^a f(x)dx = \begin{cases} 2\int_0^a f(x)dx, & \text{if } f(x) \text{ is a even function} \\ 0, & \text{if } f(x) \text{ is an odd function} \end{cases}$

Example

Evaluate the definite integral

$$\int_0^a \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a-x}}\,dx$$

Example

Evaluate the definite integral

$$\int_0^{\pi/2} \frac{sin^4\, x}{sin^4\, x + cos^4\, x}\, dx$$

Example

Evaluate the definite integral

$$\int_{-\pi/4}^{\pi/4} x^5 \sin^6 x \, dx$$

Example

Evaluate the definite integral

$$\int_0^{2\pi} cos^5 x \, dx$$

Assignments

Evaluate the definite integral

(a) $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}\,dx$

(b) $\int_{-1}^{1} e^{|x|}\,dx$

(c) $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x}\,dx$

(d) $\int_{\pi/6}^{\pi/3} \frac{1}{1+\sqrt{\tan x}}\,dx$

(e) $\int_0^1 x(1-x)^n dx$

(g) $\int_{-1}^{1} x^{17} \cos^4 x\,dx$

(g) $\int_{-\pi}^{\pi} \sin^3 x\,dx$

(h) $\int_{-\pi}^{\pi} \cos^3 x\,dx$

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