09 INTEGRATION

Definition

Basic concept of integration, integration by parts. All formula. Method of substitution, Special formula, Properties of definite integration and related problems.

PROBLEMS

1. Proof the following formulas:

$\int \tan x\, dx$	$\int \cot x\, dx$	$\int \sec x\, dx$
$\int \cos ec x\, dx$	$\int \frac{1}{x^2+a^2}\, dx$	$\int \frac{1}{x^2-a^2}\, dx$
$\int \frac{1}{a^2-x^2}\, dx$	$\int \frac{f'(x)}{f(x)} dx$	$\int \frac{1}{\sqrt{x}}\, dx$

2. Evaluate the followings:

$\int x\left(x^2+x-1\right) dx$	$\int \left(e^x-5a^x+2\right) dx$	$\int \frac{x+2\sqrt{x}+7}{\sqrt{x}}\, dx$
$\int \frac{1}{\sqrt{x}}\, dx$	$\int \left(\frac{1-\sin x}{1+\sin x}\right) dx$	$\int \frac{\sin x+\cos x}{\sqrt{(1+\sin 2x)}} dx$
$\int \frac{dx}{x^2+5x+6} dx$	$\int \sin^2 x\, dx$	$\int \cos^2 x\, dx$
$\int \sin^4 x\, dx$	$\int \cos^4 x\, dx$	$\int \left(\cos^4 x-\sin^4 x\right) dx$

3. Method of Substitution:

$\int \sin^3 x\, dx$	$\int \cos^3 x\, dx$	$\int \sin^5 x\, dx$
$\int \cos^5 x\, dx$	$\int \sin^4 x \cos^3 x\, dx$	$\int \frac{\sin x+\cos x}{\sqrt{(1+\sin 2x)}} dx$
$\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$	$\int \frac{dx}{\left(1+x^2\right)^{\frac{3}{2}}} dx$	$\int \cos^7 x\, dx$

CamScanner

4. UV formula : Evaluate (a) $\int e^{ax}\sin bx\,dx$ (b) $\int e^{ax}\cos bx\,dx$ (c) $\int x^2\sin 2x\,dx$

5. Definite Integration:
Evaluate:

$\int_0^2 \frac{dx}{16-x^2}$	$\int_0^{\frac{\pi}{4}} \cos^2\theta\,d\theta$	$\int_0^1 \frac{\tan^{-1}x\,dx}{1+x^2}$
$\int_0^{\frac{\pi}{2}} \cos^7\theta\,d\theta$	$\int_0^3 \frac{dx}{\left(3+x^2\right)^{\frac{3}{2}}}$	$\int_0^1 \frac{dx}{\left(1+x^2\right)\sqrt{1-x^2}}$

6. Definite Integration: Properties related problem

$\int_0^{\frac{\pi}{2}} \frac{\cos x}{\cos x+\sin x}dx$	$\int_0^{\frac{\pi}{2}} \frac{dx}{1+\cot x}$	$\int_0^1 \frac{\sqrt{\sin x}\,dx}{\sqrt{\sin x}+\sqrt{\cos x}}$

7. Applications:
(a) Find the area of a circle by using integration.
(b) Find the area of an ellipse by using integration.

END

CamScanner