11-2 Integration Using a Table of Integrals

Learning Objectives:

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Ex1. $\int \frac{dx}{(x^2+4)^2}$ #17

7. $\int \frac{dx}{(a^2+x^2)^2} = \frac{x}{2a^2(a^2+x^2)} + \frac{1}{2a^3}\tan^{-1}\frac{x}{a} + C$

$a=2$

$= \frac{x}{8(4+x^2)} + \frac{1}{16}\tan^{-1}\left(\frac{x}{2}\right) + C$

Ex2. $\int \frac{\sqrt{8-x^2}}{x}dx$ $a=\sqrt{8}$ $a=8$

31. $\int \frac{\sqrt{a^2-x^2}}{x}dx = \sqrt{a^2-x^2} - a\ln\left|\frac{a+\sqrt{a^2-x^2}}{x}\right| + C$

$\sqrt{8-x^2} - \sqrt{8}\ln\left|\frac{\sqrt{8}+\sqrt{8-x^2}}{x}\right| + C$

Ex3. $\int \sec(x)dx$

88. $\int \sec ax\,dx = \frac{1}{a}\ln|\sec ax + \tan ax| + C$

$\ln|\sec(1x)+\tan(1x)|+C$

Ex4. $\int \sec^3(x)dx$

92. $\int \sec^n ax\,dx = \frac{\sec^{n-2} ax \tan ax}{a(n-1)} + \frac{n-2}{n-1}\int \sec^{n-2} ax\,dx, \quad n \neq 1$

88. $\int \sec ax\,dx = \frac{1}{a}\ln|\sec ax + \tan ax| + C$

$\sec^3(x)$ #92 $n=3$ $a=1$

$\frac{\sec x \tan x}{1(3-1)} + \frac{1}{2}\int \sec x$

$\frac{\sec x \tan x}{2} + \frac{1}{2}(\ln|\sec x + \tan x|) + C$

Ex6. $\int \sinh^3(4x)dx$ $n=3$ $a=4$

117. $\int \sinh^n ax\,dx = \frac{\sinh^{n-1} ax \cosh ax}{na} - \frac{n-1}{n}\int \sinh^{n-2} ax\,dx, \quad n \neq 0$

113. $\int \sinh ax\,dx = \frac{1}{a}\cosh ax + C$

$$\frac{\sinh^2(4x)\cosh(4x)}{12} - \frac{2}{3}\left[\frac{1}{4}\cosh(4x)\right] + C$$

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Ex8. $\int \cot^3\left(\frac{1}{2}x\right)dx$

87. $\int \cot^n ax\,dx = -\frac{\cot^{n-1} ax}{a(n-1)} - \int \cot^{n-2} ax\,dx,\ n \neq 1$

$n=3$
$a=\frac{1}{2}$

$-\cot^2\left(\frac{1}{2}x\right) - \int \cot\left(\frac{1}{2}x\right)dx$

$-\cot^2\left(\frac{1}{2}x\right) - \left(2\ln\left|\sin\left(\frac{1}{2}x\right)\right|\right) + C$

83. $\int \cot ax\,dx = \frac{1}{a}\ln|\sin ax| + C$

Homework

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