

Salahaddin University-Erbil
College of Engineering
Department of Water Resources Engineering
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Mathematics II

Transcendental Function

Chapter Six

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6.4. Natural Logarithm

- Simplify $\ln \sqrt[3]{25}$
- Integrate

$$\int \frac{6x}{3x^2 + 4} dx$$

- Find y' for the followings:

$$y = \ln \frac{x\sqrt{x+25}}{(x-1)^3}$$

$$y^{2/3} = \frac{(x^2 + 1)(3x + 4)^{\frac{1}{2}}}{\sqrt[3]{(2x - 3)(x^2 - 4)}}$$

The integrals of $\tan x$ and $\cot x$

$$\int \tan u \, du = -\ln|\cos u| + C = \ln|\sec u| + C$$

$$\int \cot u \, du = \ln|\sin u| + C = -\ln|\csc u| + C$$

- Example:

$$\int_0^{\pi/6} \tan 2x \, dx$$

Examples:

- Derivatives of Logarithms

$$y = \frac{x^3}{3} \ln x - \frac{x^3}{9}$$

$$y = \ln \left(\frac{(x^2 + 1)^5}{\sqrt{1-x}} \right)$$

- Integration:

$$\int_{\pi/2}^{\pi} 2 \cot \frac{\theta}{3} d\theta$$

Class Activity

- $\int \frac{\sec y \tan y}{2 + \sec y} dy$