

5.7 examples

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Calculus AB – 5.7 Examples

Example 1 Evaluate:

a) $\int_0^1 \frac{dx}{x^2+1}$

b) $\int_0^2 \frac{dx}{\sqrt{9-x^2}}$

$$\begin{aligned} &= \tan^{-1} x \Big|_0^1 = \tan^{-1} 1 - \tan^{-1} 0 \\ &= \frac{\pi}{4} - 0 = \frac{\pi}{4} \end{aligned}$$

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Example 2 – Using Substitution

Evaluate $\int_{1/\sqrt{2}}^1 \frac{dx}{x\sqrt{4x^2-1}}$

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Evaluate $\int_{1/\sqrt{2}}^1 \frac{dx}{x\sqrt{4x^2-1}}$

Example 3 Evaluate:

$$a) \int_2^5 10^x dx = \frac{10^x}{\ln 10} \Big|_2^5$$

$$\frac{10^5 - 10^2}{\ln 10} = \frac{99,900}{\ln 10}$$

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$$b) \int_0^{\pi/2} (\cos \theta) 10^{\sin \theta} d\theta$$

$$u = \sin \theta$$

$$du = \cos \theta d\theta$$

$$\int 10^u du$$

$$= \frac{10^u}{\ln 10}$$

$$\frac{10^u}{\ln 10} \Big|_0^1$$

$$= \frac{10 - 1}{\ln 10} = \frac{9}{\ln 10}$$

$$\frac{d}{dx} b^x = b^x \cdot \ln b$$

$$\frac{d}{dx} b^{x^3} = b^{x^3} \cdot \ln b \cdot 3x^2$$

$$\int b^x dx = \frac{b^x}{\ln b} + C$$