

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

$$\int \frac{1}{\sqrt{9(1-x^2/9)}} dx$$
$$\frac{1}{3} \int \frac{1}{\sqrt{1-x^2/9}} dx$$

$$u = \frac{x}{3}$$
$$u^2 = x^2/9$$

$$\int \frac{du}{\sqrt{1-u^2}} = \sin^{-1} u$$

$$du = \frac{1}{3} dx$$
$$\int \frac{du}{\sqrt{1-u^2}} = \sin^{-1} u$$
$$\sin^{-1} u \Big|_0^{2/3} = \sin^{-1} \frac{2}{3} - \sin^{-1} 0$$
$$= \sin^{-1} \frac{2}{3}$$

## Example 2 – Using Substitution

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

Example 3 Evaluate:

a)  $\int_2^5 10^x dx$

+

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

$$\int \frac{dx}{|x| \sqrt{25x^2 - 1}}$$

$$u = 5x$$

$$x = u/5$$

$$du = 5 dx$$

$$\frac{1}{5} du = dx$$

$$\frac{1}{5} \int \frac{du}{|x| \sqrt{u^2 - 1}}$$

$$\frac{1}{5} \int \frac{du}{|\frac{u}{5}| \sqrt{u^2 - 1}}$$

$$\int \frac{du}{|u| \sqrt{u^2 - 1}} = \sec^{-1} u$$

$$\begin{aligned} & \int \frac{du}{|u| \sqrt{u^2 - 1}} \\ &= \sec^{-1} u \\ &= \sec^{-1} 5x + C \end{aligned}$$

$$\begin{array}{r} 355 \\ \hline 13, 15, 16, 47 \end{array}$$