

Classwork

SHANKU WILLIAMS
19/11/2019

MECHATRONICS

2. $\int \frac{dx}{x^2+8^2}$

$$x = 8 \tan \theta$$

$$\frac{dx}{d\theta} = 8 \sec^2 \theta$$

$$dx = 8 \sec^2 \theta d\theta$$

$$x^2 + 8^2 = 8^2 \tan^2 \theta + 8^2 = 8^2 (\tan^2 \theta + 1)$$

$$= 64 (\tan^2 \theta + 1)$$

$$= 64 \sec^2 \theta$$

$$\Rightarrow \int \frac{8 \sec^2 \theta d\theta}{64 \sec^2 \theta} = \int \frac{d\theta}{8}$$

$$= \frac{1}{8} [\theta] + C$$

$$= \frac{1}{8} \tan^{-1} \frac{x}{8} + C$$

$$I = \int \frac{dx}{x^2+1}$$

$$x = \sqrt{7} \tan \theta$$

$$\frac{dx}{d\theta} = \sqrt{7} \sec^2 \theta$$

$$dx = \sqrt{7} \sec^2 \theta d\theta$$

$$x^2 + (\sqrt{7})^2 = (\sqrt{7})^2 \tan^2 \theta + (\sqrt{7}^2)^2 = (\sqrt{7})^2$$

$$= 7(\tan^2 \theta + 1)$$

$$= 7 \sec^2 \theta$$

$$\Rightarrow \int \frac{\sqrt{7} (\sec^2 \theta) d\theta}{7 \sec^2 \theta} = \int \frac{\sqrt{7} d\theta}{7}$$

$$= \frac{\sqrt{7}}{7} (\theta) + c$$

$$= \frac{\sqrt{7}}{7} \tan^{-1} \frac{x}{\sqrt{7}} + c$$