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DATE SUBMITTED: 07/4/20

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DEPARTMENT: MECHANICAL.

MATRIC NO: 191ENAOB1001.

Assignment

Find the integral of the following

a. $\frac{dx}{(x^2+7)}$

b. $\frac{dx}{(x^2+0.4)}$

Solution

a. $\frac{dx}{(x^2+7)}$

$$= \int \frac{dx}{(x^2 + (\sqrt{7})^2)} = \int \frac{dx}{x^2 + 7}$$

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

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

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

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

$$= (\sqrt{7})^2 [\tan^2 \theta + 1]$$

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

$$= \int \frac{\sqrt{7} \sec^2 \theta d\theta}{7 \sec^2 \theta} = \int \frac{d\theta}{\sqrt{7}} = \frac{1}{\sqrt{7}} \int d\theta$$

$$= \frac{1}{\sqrt{7}} [0] + C$$

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

P. dx

$$(x^2 + 64)$$

$$= \int \frac{dx}{x^2 + 64}$$

$$x = 8 \tan \theta$$

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

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

$$x^2 + 64 = 8^2 \tan^2 \theta + 8^2 = 8^2 [\tan^2 \theta + 1] \\ = 64 \sec^2 \theta$$

$$= \int \frac{8 \sec^2 \theta d\theta}{64 \sec^2 \theta} = \int \frac{d\theta}{8} = \frac{1}{8} \int d\theta$$

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

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

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