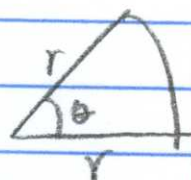


#10

$$A = \int dA = \int_0^{2\pi} \frac{1}{2} r^2 d\theta \quad \text{where } r = 1 - \cos \theta$$



$$= \frac{1}{2} \int_0^{2\pi} (1 - \cos \theta)^2 d\theta$$

$$= \frac{1}{2} \int_0^{2\pi} 1 - 2\cos \theta + \cos^2 \theta d\theta.$$

Sector
area

$$= \frac{1}{2} r^2 \theta$$

$$= \frac{1}{2} \int_0^{2\pi} 1 - 2\cos \theta + \frac{1}{2} (1 + \cos 2\theta) d\theta$$

$$\cos^2 \theta$$

$$= \frac{1}{2} (1 + \cos 2\theta)$$

$$= \frac{1}{2} \left[\theta - 2\sin \theta + \frac{1}{2} \theta + \frac{1}{4} \sin 2\theta \right] \Big|_0^{2\pi}$$

$$= \frac{1}{2} (2\pi + \pi) = \frac{3}{2} \pi$$

Answer