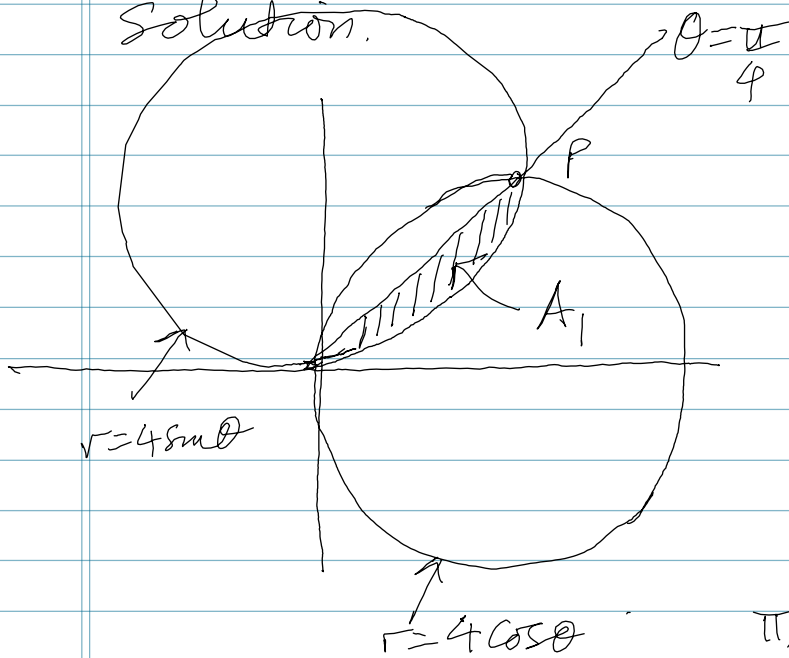


Example. Find the area of the region enclosed inside both curves $r = 4\sin\theta$ and $r = 4\cos\theta$.

Solution.



$$4\sin\theta = 4\cos\theta$$

$$\theta = \frac{\pi}{4}$$

$$P = \left(2\sqrt{2}, \frac{\pi}{4}\right)$$

$$\begin{aligned} \text{Area}(A_1) &= \frac{1}{2} \int_0^{\pi/4} 16 \sin^2\theta \, d\theta \\ &= 4 \int_0^{\pi/4} (1 - \cos 2\theta) \, d\theta \end{aligned}$$

$$\sin^2\theta = \frac{1 - \cos 2\theta}{2}$$

$$\begin{aligned} &= 4 \left[\theta - \frac{\sin 2\theta}{2} \right]_0^{\pi/4} \\ &= 4 \left[\frac{\pi}{4} - \frac{1}{2} \right] = \pi - 2. \end{aligned}$$

$$\begin{aligned} \text{Area} &= 2 \text{Area}(A_1) \\ &= 2\pi - 4 \end{aligned}$$