



2x this area
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The curves pictured above are circles of radius 1 with centers (0,1) and (1,0), respectively. Let R be the region which lies inside **both** of these circles (that is, the intersection of the two disks). Write down an integral, including the limits of integration, that represents the area of R . Bonus points for computing the area by evaluating the integral.

$$2 \int_0^{\pi/4} \frac{4 \sin^2 \theta}{2} d\theta = 4 \int_0^{\pi/4} \left[\frac{1}{2} - \frac{\cos(2\theta)}{2} \right] d\theta$$

$$= 2 \int_0^{\pi/4} [1 - \cos 2\theta] d\theta = 2 \left[\theta \Big|_0^{\pi/4} - \frac{\sin 2\theta}{2} \Big|_0^{\pi/4} \right]$$

$$= 2 \left[\frac{\pi}{4} - 0 - \frac{\sin 2 \cdot \frac{\pi}{4}}{2} + \frac{\sin 2 \cdot 0}{2} \right]$$

$$= \boxed{\frac{\pi}{2} - 1}$$