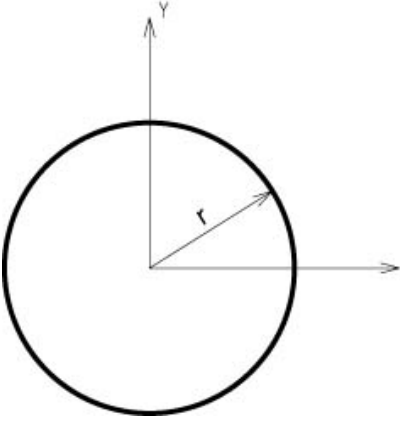


Calculus II
Area of circle with radius r



$$A = 4 \int_0^r \sqrt{r^2 - x^2} dx$$

$$4 \int_0^{\pi/2} \sqrt{r^2 - r^2 \sin^2 \theta} \cdot r \cos \theta d\theta$$

So, we have

$$\begin{aligned} & 4r^2 \int_0^{\pi/2} \cos^2 \theta d\theta \\ &= 4r^2 \int_0^{\pi/2} \left[\frac{1}{2} + \frac{1}{2} \cos 2\theta \right] d\theta \\ &= 4r^2 \left[\frac{1}{2} \theta + \frac{1}{2} \sin 2\theta \right]_0^{\pi/2} \\ &= 4r^2 \left[\frac{1}{2} \cdot \frac{\pi}{2} \right] \\ &= 4r^2 \frac{\pi}{4} \\ &= \pi r^2 \end{aligned}$$

$$\text{Let } x = r \sin \theta$$

$$\text{Then, } dx = r \cos \theta d\theta$$

$$x^2 = r^2 \sin^2 \theta$$

$$r = r \sin \theta$$

$$1 = \sin \theta$$

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