

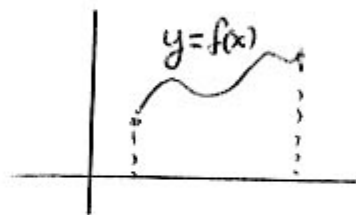
Determining the area of a region bounded by a curve in polar coordinates.

Remember:

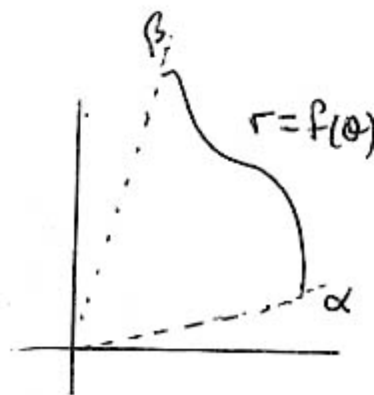
In Cartesian coordinates, we

think of the area "under" a curve,

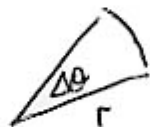
meaning between the curve and the x-axis. The basic building blocks are rectangles.



Now in polar coordinates, we consider the area swept out by lines from the origin to points on the curve as



θ runs from α to β . Now the basic building blocks are sectors of circles:



To calculate the area of such a sector, use

$$\frac{\Delta A}{\pi r^2} = \frac{\Delta \theta}{2\pi} \Rightarrow \Delta A = \frac{1}{2} r^2 \Delta \theta$$

This gives:
$$A = \frac{1}{2} \int_{\alpha}^{\beta} [r(\theta)]^2 d\theta$$