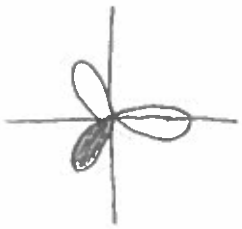
10.5 Polar Area Day 1

1) one petal of $r = 2\cos(3\theta)$



$2\cos(3\theta) = 0$

$\cos(3\theta) = 0$

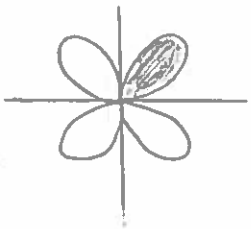
$3\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}$

$\theta = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}$

$$A = \frac{1}{2}\int_{\pi/6}^{\pi/2} (2\cos(3\theta))^2 \, d\theta$$

$A = 1.047 = \frac{\pi}{3}$

2) one petal of $r = 4\sin(2\theta)$



$4\sin(2\theta) = 0$

$\sin(2\theta) = 0$

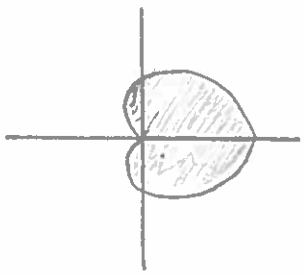
$2\theta = 0, \pi, 2\pi$

$\theta = 0, \pi/2, \pi$

$$A = \frac{1}{2}\int_{0}^{\pi/2} (4\sin(2\theta))^2 \, d\theta$$

$A = 6.283 = 2\pi$

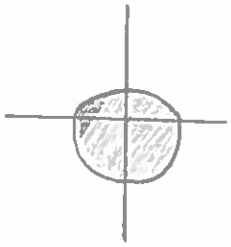
3) interior of $2 + 2\cos\theta$



$$A = \frac{1}{2}\int_{0}^{2\pi} (2 + 2\cos\theta)^2 \, d\theta$$

$A = 18.850 = 6\pi$

4) interior of $r = 2 - \sin\theta$



$$A = \frac{1}{2}\int_{0}^{2\pi} (2 - \sin\theta)^2 \, d\theta$$

$A = 14.137 = 4.5\pi$