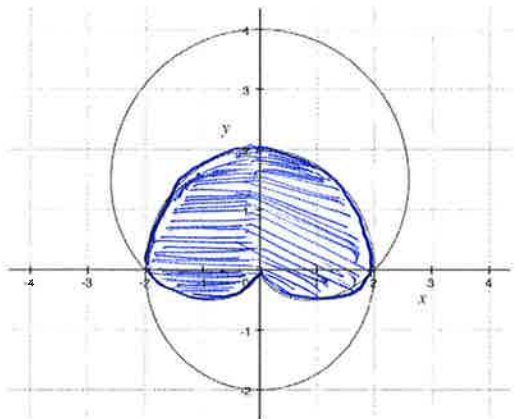


What's the area between your first and last name: Key

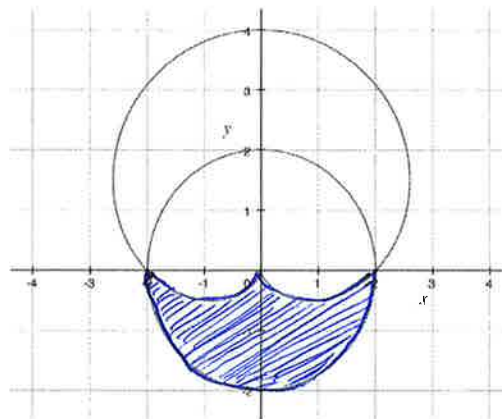
AP Calculus BC: 13.5 Polar Area Between Curves

Find the shaded region, using a calculator, for each of the following graphs. The functions are given.

1. $r = 2$
 $r = 2 + 2\sin(\theta)$



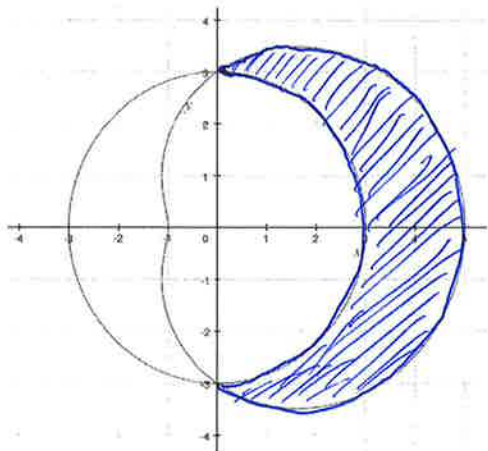
2. $r = 2$
 $r = 2 + 2\sin(\theta)$



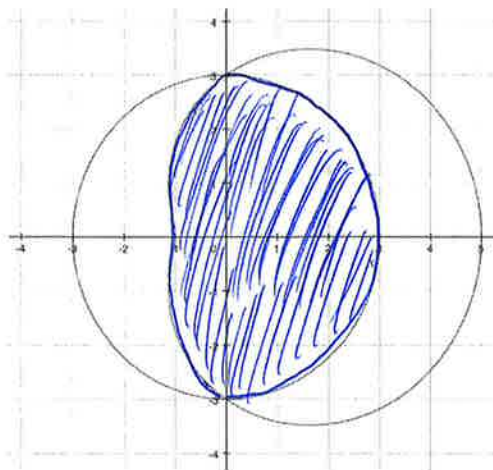
$$\frac{1}{2} \int_0^{\pi} (2)^2 d\theta + \frac{1}{2} \int_{\pi}^{2\pi} (2+2\sin(\theta))^2 d\theta = 7.708$$

$$\frac{1}{2} \int_{\pi}^{2\pi} (2)^2 - (2+2\sin(\theta))^2 d\theta = 4.858$$

3. $r = 3$
 $r = 3 + 2\cos(\theta)$



4. $r = 3$
 $r = 3 + 2\cos(\theta)$

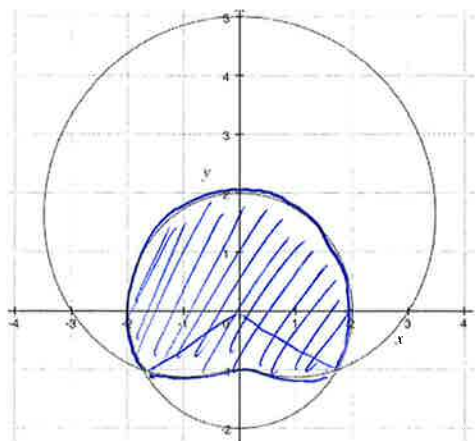


$$\frac{1}{2} \int_{\pi/2}^{3\pi/2} (3+2\cos(\theta))^2 - 3^2 d\theta = 15.142$$

$$\frac{1}{2} \int_{\pi/2}^{3\pi/2} (3)^2 d\theta + \frac{1}{2} \int_{\pi/2}^{3\pi/2} (3+2\cos(\theta))^2 d\theta = 19.416$$

What's the area between your first and last name: _____

5. $r = 2$
 $r = 3 + 2\sin(\theta)$

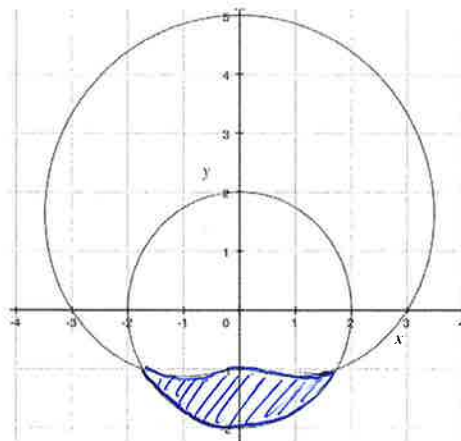


$3 + 2\sin(\theta) = 2$
 $2\sin(\theta) = -1$
 $\sin(\theta) = -1/2$
 $\theta = \frac{7\pi}{6}, \frac{11\pi}{6}$

$\frac{S/A}{T/C}$

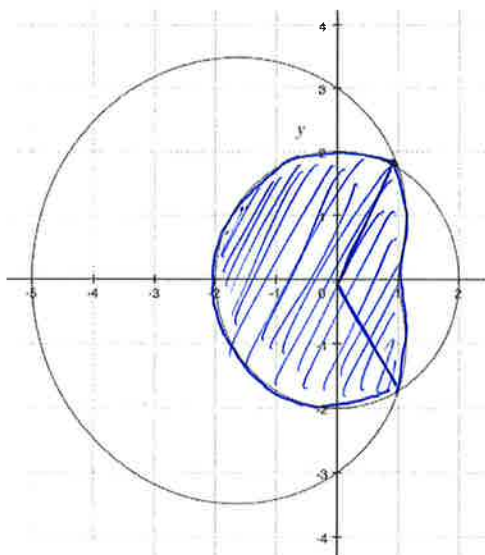
$$\frac{1}{2} \int_{\frac{7\pi}{6}}^{\frac{11\pi}{6}} (3 + 2\sin(\theta))^2 d\theta + \frac{1}{2} \int_{-\pi/6}^{\pi/6} (2)^2 d\theta = 10.370$$

6. $r = 2$
 $r = 3 + 2\sin(\theta)$



$$\frac{1}{2} \int_{\frac{7\pi}{6}}^{\frac{11\pi}{6}} (2)^2 - (3 + 2\sin(\theta))^2 d\theta = 2.196$$

7. $r = 2$
 $r = 3 - 2\cos(\theta)$

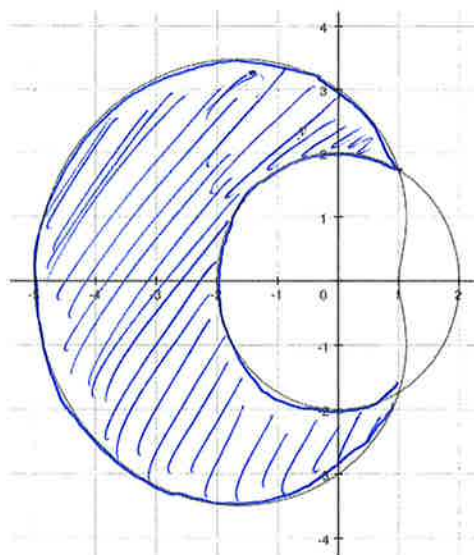


$2 = 3 - 2\cos(\theta)$
 $-1 = -2\cos(\theta)$
 $1/2 = \cos(\theta)$
 $\theta = \frac{\pi}{3}, \frac{5\pi}{3}$

$\frac{S/A}{T/C}$

$$\frac{1}{2} \int_{\frac{5\pi}{3}}^{\frac{\pi}{3}} (2)^2 d\theta + \frac{1}{2} \int_{-\pi/3}^{\pi/3} (3 - 2\cos(\theta))^2 d\theta = 10.370$$

8. $r = 2$
 $r = 3 - 2\cos(\theta)$



$$\frac{1}{2} \int_{\frac{\pi}{3}}^{\frac{5\pi}{3}} (3 - 2\cos(\theta))^2 - (2)^2 d\theta = 24.187$$