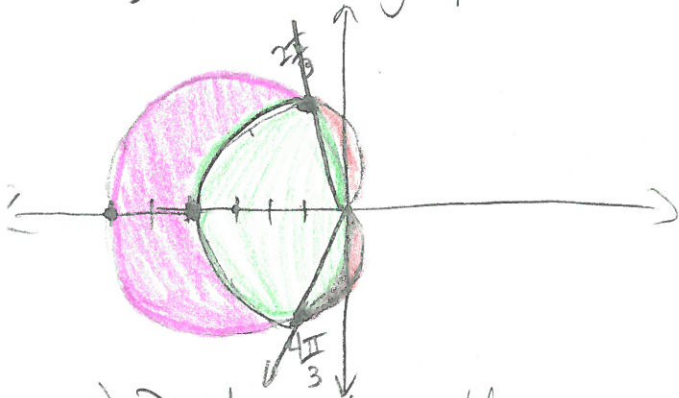


Given  $r = -6\cos\theta$  and  $r = 2 - 2\cos\theta$

a) Sketch graph and determine intersections



$$-6\cos\theta = 2 - 2\cos\theta$$

$$-4\cos\theta = 2$$

$$\cos\theta = -1/2$$

$$\theta = 2\pi/3, 4\pi/3$$

b) Determine the area of the common interior

$$2 \cdot \frac{1}{2} \int_{\pi/2}^{2\pi/3} (-6\cos\theta)^2 d\theta + \frac{1}{2} \int_{2\pi/3}^{4\pi/3} (2 - 2\cos\theta)^2 d\theta$$

symmetry

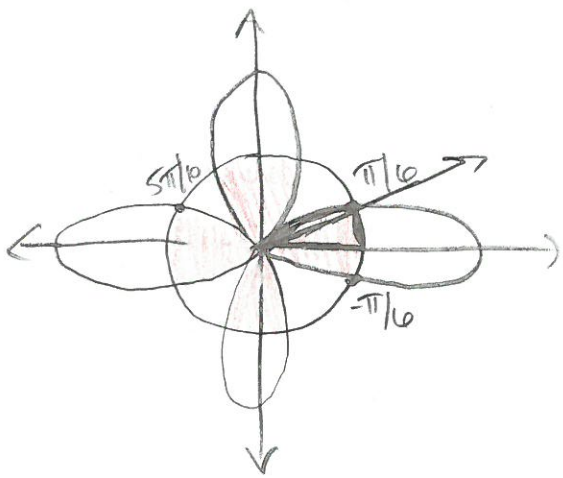
c) Determine the area inside the cardioid and outside the circle.  $2\pi/3$

$$2 \left[ \frac{1}{2} \int_0^{2\pi/3} (2 - 2\cos\theta)^2 d\theta - \frac{1}{2} \int_{\pi/2}^{2\pi/3} (-6\cos\theta)^2 d\theta \right]$$

d) Determine the area inside the circle and outside the cardioid.

$$\frac{1}{2} \int_{2\pi/3}^{4\pi/3} (-6\cos\theta)^2 d\theta - \frac{1}{2} \int_{2\pi/3}^{4\pi/3} (2 - 2\cos\theta)^2 d\theta$$

$$r = 4\cos 2\theta \text{ and } r = 2$$



Common interior

$$4\cos 2\theta = 2$$

$$\cos 2\theta = \frac{1}{2}$$

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

$$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \dots$$

when @ pole?  $4\cos 2\theta = 0$

$$\cos 2\theta = 0$$

$$2\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \dots$$

$$\theta = \frac{\pi}{4}, \dots$$

$$8 \left[ \frac{1}{2} \int_0^{\pi/6} (2)^2 d\theta + \frac{1}{2} \int_{\pi/6}^{\pi/4} (4\cos 2\theta)^2 d\theta \right]$$