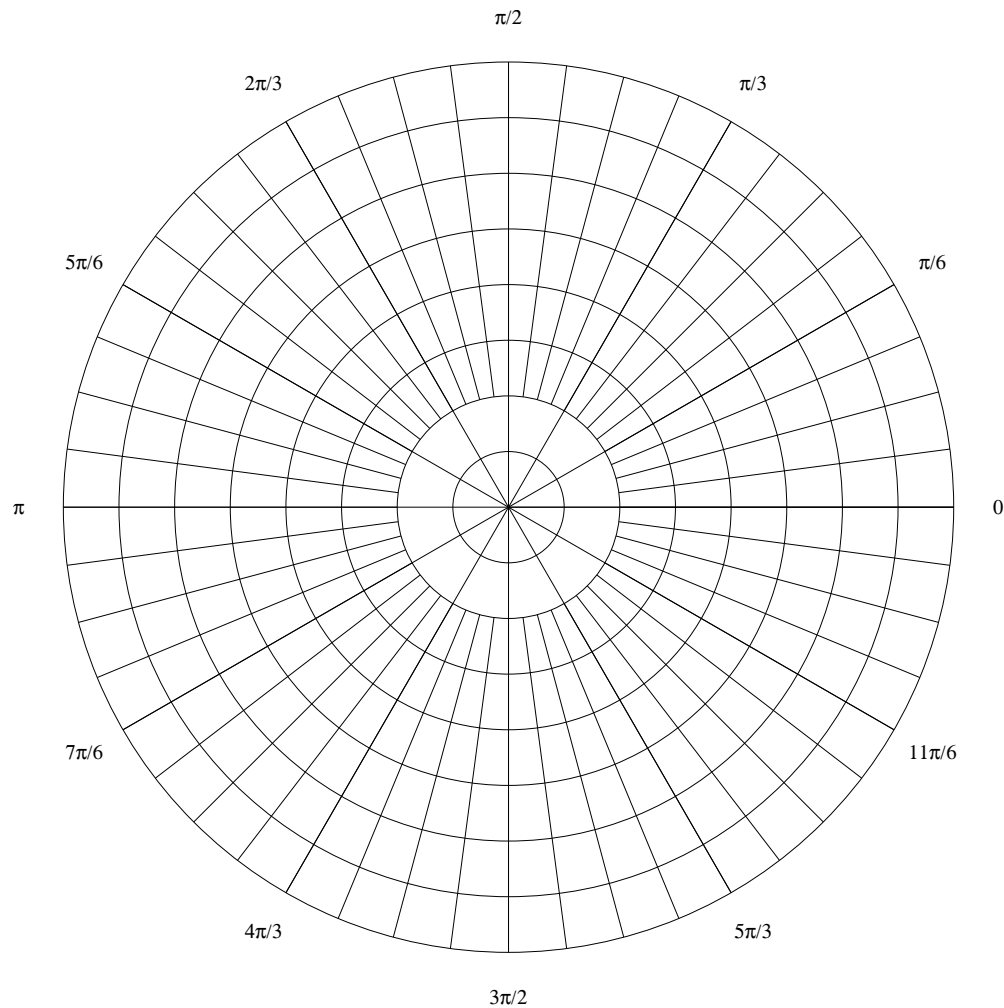


- Plot these points, which are given in polar coordinates  $(r, \theta)$ .  
 A.  $(2, \frac{\pi}{2})$    B.  $(3, \frac{\pi}{4})$    C.  $(7, \pi)$    D.  $(-4, 0)$    E.  $(-5, -\frac{\pi}{2})$
- Sketch the *cardioid* given in polar form by  $r = 5 - 2 \cos(\theta)$  for  $\theta \in [0, 2\pi]$ .



- Find the arclength and area of the cardioid. You'll want to use software to do the integrals.

**Solution:** The arclength is

$$\int_0^{2\pi} \sqrt{(2 \sin(\theta))^2 + (5 - 2 \cos(\theta))^2} d\theta \approx 32.69$$

The area is

$$\int_0^{2\pi} \frac{1}{2} (5 - 2 \cos(\theta))^2 d\theta \approx 84.82$$