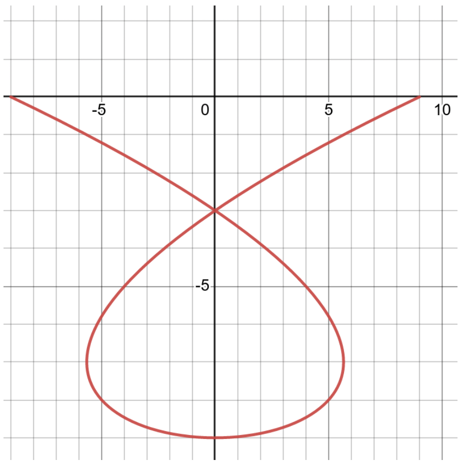
172 Exam 3 Name: ______________________________

For the curve defined by the parametric equations

$$x = t^3 - 6t, y = t^2 - 9$$



1. Find and label 4 points on the graph.

2. Find $\dfrac{dy}{dx}$

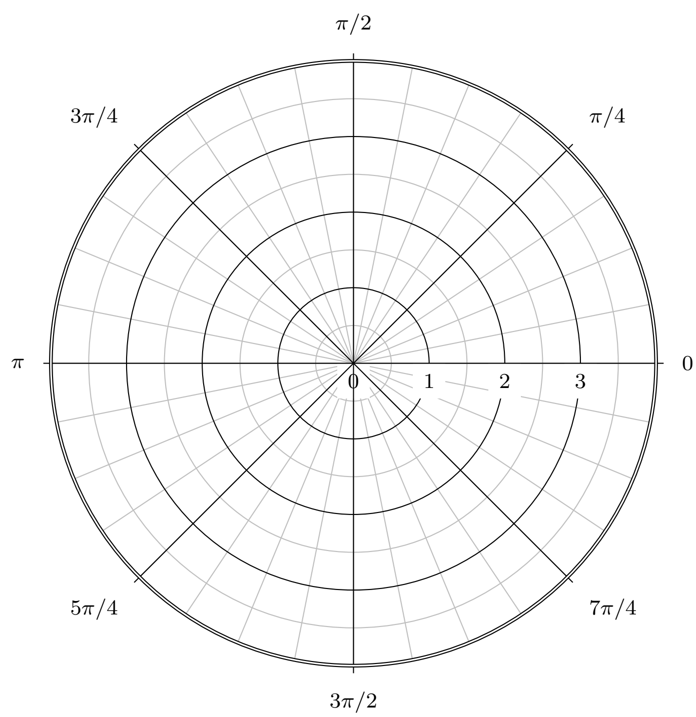
3. Find the slope of the tangent line at $(4, -5)$ hint: make sure to find t first.

4. Find the arc length of the curve for $0 < t < 3$

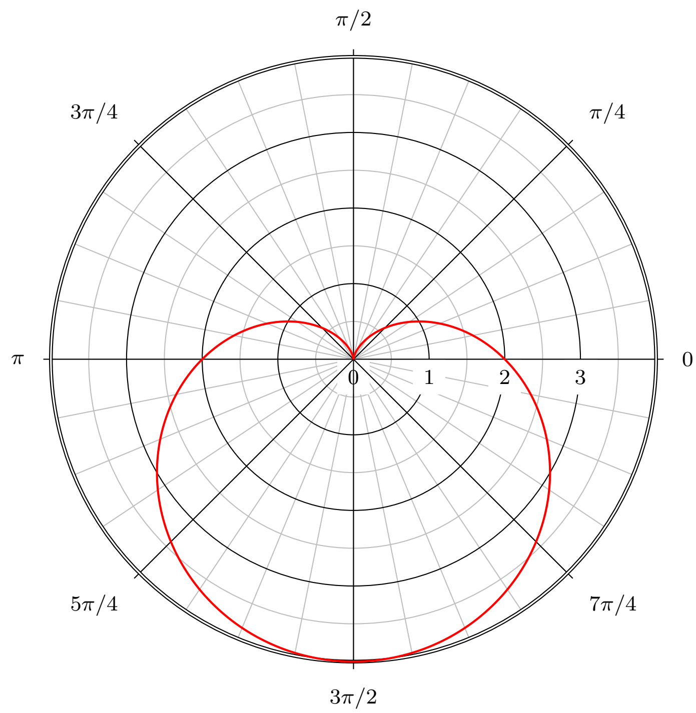
1. Convert the rectangular coordinates $(2, -2)$ to polar coordinates

2. Convert the polar coordinates $(4, \frac{\pi}{6})$ to rectangular coordinates

3. Draw a quick sketch of three polar equations: $r = 2, \theta = \frac{\pi}{3}, r = 2\sin(\theta)$



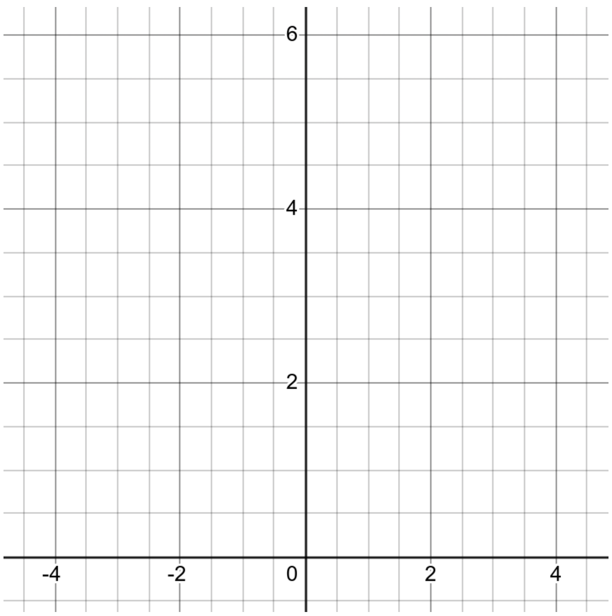
4. Find the area enclosed by the curve $r = 2 - 2\sin(\theta)$



5. Find the points on the curve$r = 2 - 2\sin(\theta)$ where the tangent lines are horizontal.

6. Find the focus and the directrix of the parabola given by $y^2 = -8x$

7. Write the equation of the ellipse given by $9x^2+4y^2-24y = 0$ in standard form. Identify the foci. vertices, and eccentricity. Graph the ellipse.



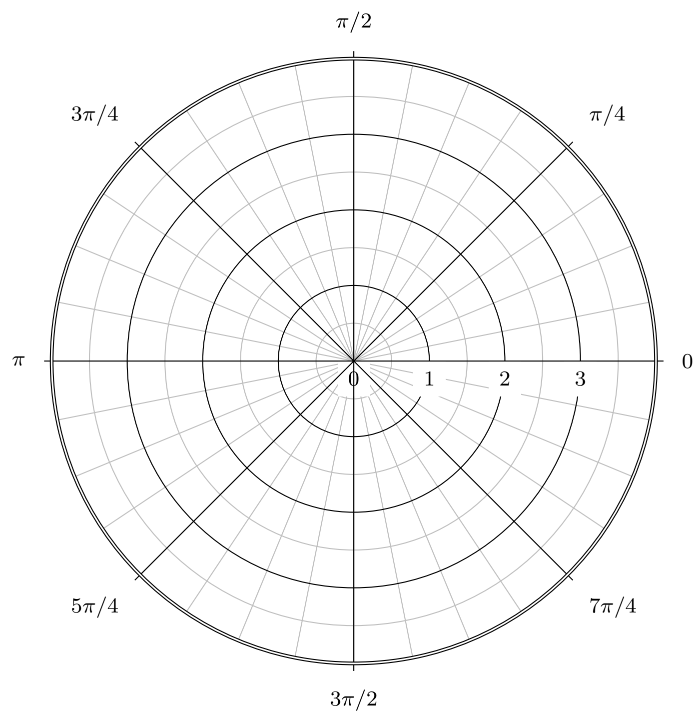
8. For the polar equation

$$r = \frac{8}{1 + 3\cos(\theta)}$$

(a) Identify the eccentricity

(b) Identify the conic

(c) Graph the conic by plotting the points for
$\theta = 0, \theta = \frac{\pi}{2}, \theta = \pi, \theta = \frac{3\pi}{2}$



(d) Convert the polar equation to rectangular form for extra credit.