

**MA 114 Worksheet #23: Polar coordinates**

1. Convert from rectangular to polar coordinates:

(a)  $(1, \sqrt{3})$

(b)  $(-1, 0)$

(c)  $(2, -2)$

2. Convert from polar to rectangular coordinates:

(a)  $\left(2, \frac{\pi}{6}\right)$

(b)  $\left(-1, \frac{\pi}{2}\right)$

(c)  $\left(1, -\frac{\pi}{4}\right)$

3. Sketch the graph of the polar curves:

(a)  $\theta = \frac{3\pi}{4}$

(b)  $r = \pi$

(c)  $r = \cos \theta$

(d)  $r = \cos(2\theta)$

(e)  $r = 1 + \cos \theta$

(f)  $r = 2 - 5 \sin \theta$

4. Find the equation in polar coordinates of the line through the origin with slope  $\frac{1}{3}$ .

5. Find the polar equation for:

(a)  $x^2 + y^2 = 9$

(b)  $x = 4$

(c)  $y = 4$

(d)  $xy = 4$

6. Convert the equation of the circle  $r = 2 \sin \theta$  to rectangular coordinates and find the center and radius of the circle.

7. Find the distance between the polar points  $(3, \pi/3)$  and  $(6, 7\pi/6)$ .