

**MA114 Summer 2018**  
**Worksheet 24 – Polar Coordinates – 7/25/18**

1. Convert from rectangular to polar coordinates:

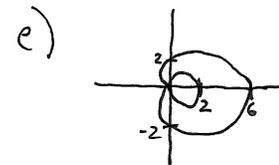
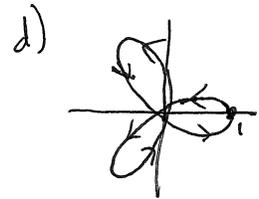
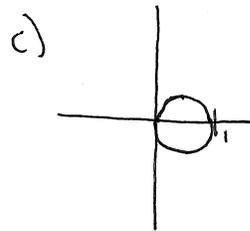
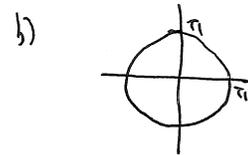
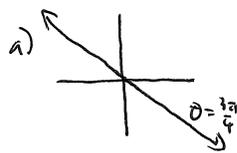
- a)  $(1, \sqrt{3})$        $r = 2, \theta = \pi/3$   
 b)  $(-1, 0)$        $r = 1, \theta = \pi$   
 c)  $(2, -2)$        $r = 2\sqrt{2}, \theta = -\frac{\pi}{4}$

2. Convert from polar to rectangular coordinates:

- a)  $(2, \pi/6)$        $x = \sqrt{3}, y = 1$   
 b)  $(-1, \pi/2)$        $x = 0, y = -1$   
 c)  $(1, \pi/4)$        $x = \frac{1}{\sqrt{2}}, y = \frac{1}{\sqrt{2}}$

3. Sketch the graph of the polar curves:

- a)  $\theta = 3\pi/4$   
 b)  $r = \pi$   
 c)  $r = \cos \theta$   
 d)  $r = \cos(3\theta)$   
 e)  $r = 2 + 4\cos(\theta)$



4. Find a polar equation for:

- a)  $(x - 2)^2 + y^2 = 9$        $r = 6 \cos \theta$   
 b)  $y = 4$        $r = 4 \csc \theta$   
 c)  $x = 4$        $r = 4 \sec \theta$   
 d)  $xy = 4$        $r^2 \sin \theta \cos \theta = 4$   
 e) The line through the origin with slope  $1/3$ .       $\theta = \tan^{-1}(\frac{1}{3})$

5. Convert the equation of the circle  $r = 2 \sin(\theta)$  to Cartesian coordinates and find its center and radius.

$$\begin{aligned} r^2 &= 2r \sin \theta \\ x^2 + y^2 &= 2y \\ x^2 + y^2 - 2y &= 0 \\ x^2 + y^2 - 2y + 1 &= 1 \\ x^2 + (y-1)^2 &= 1 \\ \text{center } (0, 1), \text{ radius } &1 \end{aligned}$$