

Math 120 Quiz #8

1. (3 pts.) Convert $r^3 = r + 2 \sin \theta$ into a rectangular equation.

Note that $\sin \theta = \frac{y}{r} \Rightarrow r^3 = r + 2 \cdot \frac{y}{r} \Rightarrow r^4 = r^2 + 2y$

Using the fact that $r^2 = x^2 + y^2$, we have that

$$r^4 = r^2 + 2y \Rightarrow (x^2 + y^2)^2 = x^2 + y^2 + 2y \leftarrow \text{Rectangular form}$$

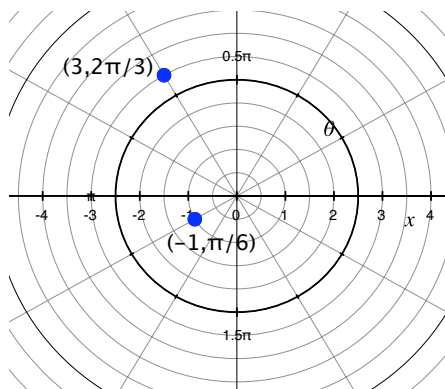
2. (3 pts.) Sketch the following points given in polar coordinates on the given polar grid. Label each point.

(a) $(3, \frac{2\pi}{3})$

This point is three units away from the origin in the direction of $\theta = \frac{2\pi}{3}$.

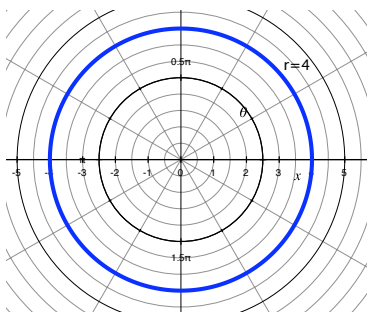
(b) $(-1, \frac{\pi}{6})$

This point is one unit away from the origin in the direction opposite of $\theta = \frac{\pi}{6}$.



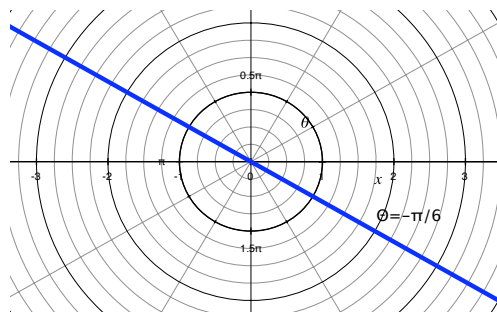
3. (4 pts.) Sketch the following curves of each polar equation on the given polar grid. Label each curve.

(a) $r = 4$



$r = 4$ describes a circle with center at the origin and a radius of 4 units.

(b) $\theta = -\frac{\pi}{6}$



$\theta = -\frac{\pi}{6}$ describes a line through the origin that has a direction determined by the angle $\theta = -\frac{\pi}{6}$.