13.4: Polar Coordinates

REVIEW:

The connection between polar and Cartesian coordinates:

$$\cos\theta = \qquad\qquad\qquad \sin\theta =$$

$$x = \qquad\qquad\qquad y =$$

$$r^2 = \qquad\qquad\qquad \tan\theta =$$

REMARK 1. In converting from the Cartesian to polar coordinates we must choose θ so that the point (r, θ) lies in the correct quadrant.

EXAMPLE 2. *What curve is represented by the polar equation*

(a) $r = 12$

(b) $\theta = \frac{\pi}{3}$

EXAMPLE 3. *Sketch the region in the Cartesian plane consisting of points whose polar coordinates satisfy the following conditions:* $1 \leq r \leq 2, \quad \pi/4 \leq \theta \leq \pi.$

EXAMPLE 4. *Find a polar equation for the curve represented by the given Cartesian equation:*

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

(b) $(x - a)^2 + y^2 = a^2$