8.2 Polar Equations and Graphs

Polar Curves: the **graph** of a polar equation \( r = f(\theta) \) [or \( F(r, \theta) = 0 \)] is the set of points \((r, \theta)\) that satisfy the equation.

Examples:

1) \( r = k \)

2) \( \theta = k \)

3) \( r = 4 \sin \theta \)

4) \( r = 1 + \cos \theta \) (cardioid)

5) \( r = a + b \sin \theta \) (limaçon)

**Symmetry:**

- about polar axis -- replace \( \theta \) with \( -\theta \) yields same equation.

- about (vertical) line \( \theta = \frac{\pi}{2} \) -- replace \( \theta \) with \( \pi - \theta \) yields same equation.

- about origin (pole) -- replace \( r \) with \( -r \) (or \( \theta \) with \( \theta + \pi \)) yields same equation (view as a rotation of \( \pi = 180^\circ \))