**Using the Document:** Polar_Graphs.tns

This tns file is used to practice plotting and visualizing points in the plane represented by the polar coordinates $(r,\theta)$. The polar grid lines with common angles are displayed. Pages 2 and 3 are used to plot polar functions of the form $r = f(\theta)$.

**Suggested Applications and Extensions**

Use Page 1.2 to help answer the following questions.

1. Plot the point whose polar coordinates are given. Find two other pairs of polar coordinates for this point, one with $r > 0$ and one with $r < 0$.

   (a) $\left(2,\frac{\pi}{6}\right)$ (b) $(-1,\pi)$ (c) $\left(2,-\frac{\pi}{6}\right)$

   (d) $\left(3,\frac{3\pi}{4}\right)$ (e) $\left(4,-\frac{5\pi}{6}\right)$ (f) $\left(-2,-\frac{4\pi}{3}\right)$

2. Plot the point whose polar coordinates are given. Find the Cartesian coordinates of the point.

   (a) $\left(3,\frac{\pi}{2}\right)$ (b) $(-2,3\pi)$ (c) $\left(-4,\frac{\pi}{6}\right)$

   (d) $\left(1,\frac{3\pi}{4}\right)$ (e) $\left(-2,\frac{7\pi}{4}\right)$ (f) $(-1,-\pi)$

Use page 2.2 or 3.2 to sketch the graph of $r$ as a function of $\theta$. Describe the shape of the graph.

1. $r = -3\cos\theta$
2. $r = 1 + \sin\theta$
3. $r = 1 - \cos\theta$
4. $r = \theta^2$
5. $r = 2\cos(3\theta)$
6. $r = \sin\left(\frac{\theta}{3}\right)$ What values of $\theta$ produce a complete polar graph?
7. $r = 2 + 3\cos\theta$
8. $r = 1 + 2\sin\left(\frac{\theta}{2}\right), \quad 0 \le \theta \le 4\pi$
9. $r = e^{\sin\theta} - 2\cos(4\theta)$
10. $r = \sqrt{1 - 0.95\sin^2\theta}$