Calculus II
Practice Problems 11

1. Show that the graph of the polar equation $r = a\cos\theta + b\sin\theta$ is a circle of diameter $\sqrt{a^2+b^2}$ going through the origin. Where is its center?

2. Graph $r = 3(\cos\theta + \sqrt{3}\sin\theta)$.

3. What is the polar equation of an ellipse, with one focus at the origin, vertex at the point (-1,0) and directrix the line $x = -3$?

4. Identify the curve: $y = 2\sin(5\theta)$.

5. Graph $r^2 = \cos(2\theta)$. This is called a *lemniscate*.

6. Find the length of the spiral $r = e^{2\theta}$ from $\theta = 0$ to $\theta = 2\pi$.

7. Find the length of the spiral $r = e^{-\theta}$ for $\theta \geq 0$.

8. Find the area inside the limaçon $r = 3 + \sin\theta$.

9. Find the area inside the cardioid $r = 1 - \sin\theta$ and above the x-axis.

10. What is the slope of the spiral $r = \theta$ at the points $\theta = 2\pi n$ for n a positive integer? What about the spiral $r = e^\theta$ at the same points?