1. A four-leaved rose is defined in polar coordinates by the equation \( r = \sin(2\theta) \). Make a careful sketch of \( r \) against \( \theta \) on the rectangular axes. Use this to make a careful sketch of the polar curve. Be sure that important angles are labelled clearly.

2. A cardioid is defined in polar coordinates by the equation \( r = 1 + \sin \theta \). Make a careful sketch of \( r \) against \( \theta \) on the rectangular axes. Use this to make a careful sketch of the polar curve. Be sure that important angles are labelled clearly.
3. A limaçon is defined in polar coordinates by the equation $r = 2 \sin \theta - 1$. Make a careful sketch of $r$ against $\theta$ on the rectangular axes. Use this to make a careful sketch of the polar curve. Be sure that important angles are labelled clearly.

4. Recall the basic formulas $x = r \cos \theta$, $y = r \sin \theta$ and the chain rule: $\frac{dy}{dx} = \frac{dy/d\theta}{dx/d\theta}$.

Use these to find a general formula for the slope of the tangent line of the limaçon in the previous problem in terms of $\theta$. Find the slope of the tangent line at the points where $\theta = 0$ and at $\theta = \pi/2$, and sketch those tangent lines carefully on your graph.

5. Repeat Problem 4 for the cardioid which you sketched on the previous page at the points where $\theta = 0$ and $\theta = \pi$. 