These are practice problems from sections 12.6, 12.7, 13.1, 13.2, and 13.3. The first part of the final will be on these sections.

1. Sketch the graph of the polar form equation $r = 2 + \sin(\theta)$.

2. Express the following equation in terms of polar coordinates. Then choose which representation of the equation, polar or Cartesian, you think is better. Explain your choice.

   $$(x^2 + y^2)^2 - 16 = 0$$

3. Given the function $y = x^3 + 1$, find parametric descriptions $(x(t), y(t))$ that satisfy the following conditions. That is, for each part, find functions $(x(t), y(t))$ that satisfy the condition.

   (a) Traverses the curve from left to right as $t$ increases and satisfies $x(0) = 0, y(0) = 1$.
   (b) Traverses the curve from right to left as $t$ increases and satisfies $x(0) = -1, y(0) = 0$.

4. Consider the parametric curve given by $x = 2 \cos(t)$ and $y = \sin(t)$. First, show that this curve represents the ellipse

   $$\frac{x^2}{4} + y^2 = 1$$

   Then, find an equation for the tangent line to the curve at $t = \pi/6$.

5. Sketch the graph of the following polar-form equation. Label at least three points with the values of $\theta$ to which they correspond.

   $$r = 4 - 4 \cos(\theta)$$

6. Consider the three points with Cartesian coordinates $P(-1, 3), Q(-2, 4)$, and $R(-7, 2)$. Compute the following quantities.

   (a) $\vec{PQ}$
   (b) $\vec{QR}$
   (c) $|\vec{QR}|$
   (d) $2\vec{PQ} - 3\vec{QR}$
   (e) $\vec{PQ} \cdot \vec{QR}$.

7. Find $\cos(\theta)$ if $\theta$ is the angle between the two-dimensional vectors $\mathbf{p} = (-2, 1)$ and $\mathbf{q} = (1, 5)$.

8. Find a vector that is perpendicular to the vector $\mathbf{p} = (2, 5)$. 