1. Find two different representations in polar coordinates \((r, \theta)\) for the point with Cartesian coordinates \((-2, -2)\). One representation must satisfy \(-\pi/2 < \theta \leq \pi/2\) and the second representation must satisfy \(3\pi < \theta \leq 4\pi\).

2. Sketch the graph of the rose curve \(r = \cos(4\theta)\) and then find the area enclosed by three petals.

3. Consider the three points with coordinates \(P(1, 2, 4), Q(-2, -1, -11),\) and \(R(3, 0, 2)\). Compute the following quantities.
   
   (a) \(\vec{PQ}\)
   
   (b) \(\vec{PR}\)
   
   (c) \(\vec{PQ} + 2\vec{PR}\)
   
   (d) The equation of the line through the point \(R\) that is parallel to the vector \(\vec{PQ}\).
   
   (e) The equation of the plane through the three points \(P, Q,\) and \(R\).

4. Find a parametric description of the circle \((x - 2)^2 + (y + 4)^2 = 13\) that traverses the circle once in a counter-clockwise direction as \(t\) increases from 0 to \(\pi\). Then find the slope at the point \(x = 5, y = -2\).

5. Suppose a position function for a particle is given by \(\mathbf{r}(t) = (\sin(t^2))\mathbf{i} + (te^{-t})\mathbf{j} + (2t^4 + 7t^2)\mathbf{k}\).
   
   (a) Compute the velocity of the particle.
   
   (b) Compute the acceleration of the particle.
   
   (c) Compute the speed of the particle.