Section 10.5 P. 690 7

1. Sketch the graph of each of the following equations:
   a) \( x^2 + 12x - y + 39 = 0 \)
   b) \( 16x^2 - 9y^2 + 64x - 90y = 305 \)
   c) \( x^2 + 2y^2 - 6x + 4y + 7 = 0 \)

Section 10.1 P. 656 11, 13, 16, 20

2. Give 3 different sets of parametric equations describing curves lying on the parabola \( y = x^2 \). For each, describe how the curve is swept out.

Section 10.2 P. 666 1, 5, 7, 11, 15, 17, 29

3. Consider the parametric equations
   \[
   x = \sin^2 t \quad -\infty < t < \infty \\
   y = \cos t
   \]
   a) Find \( \frac{dy}{dx} \) and \( \frac{d^2y}{dx^2} \) in terms of \( t \)
   b) By examining the signs of \( \frac{dy}{dx} \) and \( \frac{d^2y}{dx^2} \), sketch the corresponding path.
   c) Check your answer by eliminating \( t \) and graphing the resulting cartesian equation.

Section 10.3 P. 677 1a, 3b, 9, 29, 33, 34, 39, 40

4. Sketch the graph of the polar equation \( r = \frac{1}{\theta} \), \( \theta > 0 \)

Section 10.4 P. 683 3, 7, 8, 21, 23, 27, 35, 46

5. Consider the polar equation \( r = 2 \sec \theta \), \( 0 \leq \theta \leq \frac{\pi}{4} \)
   a) Find the arclength of this piece of graph using integration.
   b) Convert the polar equation to rectangular coordinates, sketch the graph, and check your answer for a.)