1. Work the following problems from the text:
   (a) Section 11.7: 8, 26, 33, 42
   (b) Section 11.8: 18, 27, 43

2. Previously in the semester, we derived equations for the minimum distance between a point and a line, and a point and a plane. Your task is to derive the same results, but using the method of Lagrange multipliers.
   (a) Use Lagrange multipliers to establish the formula
      \[ D = \frac{|ax_0 + by_0 - d|}{\sqrt{a^2 + b^2}} \]
      for the distance \( D \) from the point \((x_0, y_0)\) to the line \(ax + by = d\).
   (b) Use Lagrange multipliers to establish the formula
      \[ D = \frac{|ax_0 + by_0 + cz_0 - d|}{\sqrt{a^2 + b^2 + c^2}} \]
      for the distance \( D \) from the point \((x_0, y_0, z_0)\) to the plane \(ax + by + cz = d\).

3. A classic problem from Calculus I is to take a wire of length \(L\) and cut it into two pieces. One piece is bent into a circular shape and the remainder is bent into a square shape.
   (a) Determine how the wire should be cut so the maximum area is enclosed. In particular, how much of the wire is used for the square, and how much is used for the circle?
   (b) How much area is enclosed in the square?
   (c) How much area is enclosed in the circle?
   (d) What is the maximum total enclosed area?

Note: although this can be worked using Calculus I concepts, work this out using Calculus III concepts.