1. A rectangle is constructed with its base on the x-axis and two of its vertices on the parabola \( Y = 16 - x^2 \).
   a. Draw a picture of this situation. (1 pt)
   b. Find a function that will give the area of the rectangle in terms of \( x \). (2 pts)

2. A box with a square base and a closed top is to be constructed so that its surface area is 108 inches\(^2\). (This is similar to one on the previous assignment, this time you start with surface area)
   a. Draw a picture of this situation. (1 pt)
   b. Find an equation for the volume of the box in terms \( x \), the length of one side of the square base. (2 pts)

3. A right circular cylinder is to be inscribed in a cone of altitude 12 centimeters and base radius 4 centimeters.
   a. Draw a picture of this situation. (1 pt)
   b. Find an expression for the volume of the cylinder in terms of \( h \) the height of the cylinder. (3 pts)

4. Given \( f(x) = \frac{-2x^2 + 14x - 24}{x^2 + 2x} \)
   a. Find the domain of this function. (1)
   b. Identify any x-intercepts or explain why none exist. (1)
   c. Identify any y-intercepts or explain why none exist. (1)
   d. Identify any vertical asymptotes or holes in the graph. (1)
   e. Identify any horizontal or oblique asymptotes. (1)
   f. Construct a sign chart for this graph. (1)
   g. Sketch a graph of this function (2)
   h. Complete each of the following. (2)

   \[
   \begin{array}{ll}
   \text{as } x \to \infty & y \to \quad \quad \\
   \text{as } x \to 0^+ & y \to \quad \quad \\
   \text{as } x \to 0^- & y \to \quad \quad \\
   \text{as } x \to -2^+ & y \to \quad \quad \\
   \end{array}
   \]