Solve the following problems. Show your work neatly organized in the space provided.
Express irrational solutions rounded to three significant digits.

1. Find the dimensions of the largest rectangular box with a square base and no top that
can be made from 675 square inches of material.

2. A rectangular box is to be three times as long as it is wide and is to have a capacity of
64 cubic feet. If the material for the top costs 10 cents per square foot, and the material
for the sides and bottom costs 20 cents per square foot, then what dimensions will
minimize the total cost of the material used?

Solve the following problems. Show your work neatly organized in the space provided. Express irrational solutions rounded to three significant digits.

3. A cylindrical can must be designed to hold a specific volume. What proportions will use the least amount of metal? To answer this question you must give the relationship between the height and the radius of the can that would result in a minimum of metal needed. The volume of a cylinder, V, is given by the formula $V = \pi r^2 h$.

4. Find the dimensions (radius and height) of the cylinder of maximum volume that can be cut from a sphere with a 6 inch radius.