**Instructions.** Show all work, with clear logical steps. No work or hard-to-follow work will lose points.

**Problem 1.** (10 points) A rectangular building with a square front is to be constructed of materials that costs 19 dollars per  $ft^2$  for the flat roof, 11 dollars per  $ft^2$  for the sides and the back, and 13 dollars per  $ft^2$  for the glass front. There are literally no other costs associated with constructing this fictitious building. If the volume of the building is 5,600 ft<sup>3</sup>, what dimensions will minimize the cost of materials?

Recall. The Lagrange equations as given to you on your exam formula sheet

 $f_x = \lambda g_x$   $f_y = \lambda g_y$  g(x, y) = c.