Name: _____ **Panther ID:** _____

Worksheet week 11/Take-home Quiz Calculus I – Spring '14

To receive credit you MUST SHOW ALL YOUR WORK.

1. Suppose you need to construct a rectangular box with a square base that holds a given volume V_0 cm^3. The box needs to use a stronger (and more expensive) material for the top and bottom than the one for the sides. Suppose that the cost of the material for the sides is 2 cents per cm^2, while the material for the top and the bottom of the box costs 3 cents per cm^2. Find, in terms of V_0, the dimensions of the box that will minimize the cost of the material. Compute also the ratio of these optimal dimensions.

2. (adapted from Stewart's Calculus) You are (unjustly) sent to jail. The prison is a tall building surrounded by an 10ft tall fence situated 6ft away from the building. Your buddies are organizing an escape for you. The main tool is a straight ladder. What is the shortest ladder that will pass over the fence, touch the ground on one side and the building on the other?