

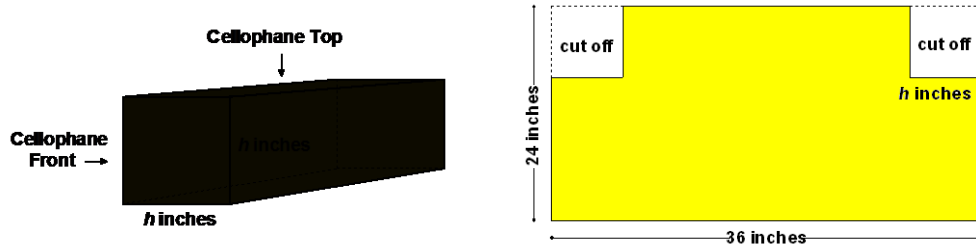
1. I need to fence in a new rectangular scratching yard for my chickens, Runt and Buff. I have purchased 80 feet of chicken wire fencing and I plan to use the barn as one side of the pen.
 - a. Which configuration will give my chickens the most room? Solve using the following steps
 - i) Carefully construct an area function,
 - ii) Use calculus to find the maximum,
 - iii) Sketch a graph of the function with everything clearly labeled, with the maximum area clearly marked on the graph and with a final sketch of the chicken's new pen with the area and fence dimensions of the pen clearly labeled.
 - b. What is the domain of your area function? (include units of feet)
 - c. What is the range of your area function? (include units of square feet)

2. I looked on the internet and decided my chickens, Runt and Buff really only need about 160 square feet of space in their scratching yard. Additionally, for better ventilation, all sides should be wire fencing. I plan to purchase new chicken wire fencing at a cost of \$2 / foot for three sides of the pen and my neighbor will sell me some old fencing for \$1 / foot for the back and less visible side of the pen.
 - a. Which rectangular configuration will cost the least to build? Solve using the following steps
 - i) Carefully construct a cost function,
 - ii) Use calculus to find the minimum cost,
 - iii) Sketch a graph of the function with everything clearly labeled, with the least cost of the pen clearly marked on the graph and with a final sketch of the pen with the cost and the fence dimensions of the pen clearly labeled.
 - b. What is the domain of your cost function? (Include units of feet). Hint: What makes sense here?
 - c. What is the range of your cost function? (Include units of \$).

(over 595 only)

595 ONLY

3. The manufacturer, *Bunnies-R-Us*, wish to make pink bunny gold foil display boxes for of maximum volume. To construct the boxes, the top and one end will be made of cellophane and the remaining sides will be cut from a sheet of 24 inch \times 36 inch gold foil. They plan to cut out two corner squares of length h inches from each gold foil sheet as illustrated in the following diagram. The 3-D box diagram shows a square ended box, and the 2-D net diagram would fold to a box with a non-square rectangular end. You may wish to cut and fold a few pieces of scratch paper to get a sense of the box construction (optional).



- Determine the volume function for the *Bunnies-R-Us* box. Give the volume as a function of the height of the box; $V(h)$ in cubic inches for a height h inches.
- Which display box configuration will contain the maximum volume? Sketch the box and label all dimensions to the nearest tenth of an inch.