Optimization Practice

You may want calculators to help you approximate answers on some of these questions.

1) A rectangular garden is to be placed along a wall with a fence surrounding the other three sides. What are the dimensions of a garden with the largest area that can be fenced off with 20 feet of fencing?

2) If $1200cm^2$ of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

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3) A container in the shape of a right circular cylinder with no top has surface area $3\pi ft^2$. What are the height and radius will maximize the volume of this container?

4) A sheet of cardboard 3ft. by 4ft. will be made into an open box by cutting equal sized squares from each corner and folding up the four edges. Find the dimensions of the box with the largest volume.

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5) A cylindrical can is to hold 20π m^3. The material for the top and bottom costs \$10/m^2 and material for the side costs \$8/m^2. Find the radius and height of the most economical can.

6) A dog breeder wants to install a kennel alongside a building with five equal sized dog pens. No fence is needed along the building. The fencing used to divide the pens costs \$10 per foot and the fencing used for the exterior of the pens costs \$30 per foot. If the dog breeder has \$1500 to spend on fencing, find the dimensions of the kennel that will maximize the area.

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7) There are 50 apple trees in an orchard. Each tree currently produces 800 apples. For each additional tree planted in the orchard, the output per tree drops by 10 apples. How many trees should be added to the orchard to maximize the total output of the trees?

8) When a theater owner charges $5 for admission, there is an average attendance of 180 people. For every $0.10 increase in admission, there is a loss of 1 customer. What admission should be charged in order to maximize revenue?