Problem 1. *An open box is to be made from a 16-inch by 30-inch piece of card-board by cutting out squares of equal size from the four corners and bending up the sides. What size should the squares be to obtain a box with the largest volume?*

Problem 2. *A garden is to be laid out in a rectangular area and protected by a chicken wire fence. What is the largest possible area of the garden if only 100 running feet of chicken wire is available for the fence?*

Problem 3. *A rectangular field is to be bounded by a fence on three sides and by a straight stream on the fourth side. Find the dimensions of the field with maximum area that can be enclosed using 1000 ft of fence.*

Problem 4. *A rectangular plot of land is to be fenced in using two kinds of fencing. Two opposite sides will use heavy-duty fencing selling for \$3 a foot, while the remaining two sides will use standard fencing selling for \$2 a foot. What are the dimensions of the rectangular plot of greatest area that can be fenced in at a cost of \$6000?*

Problem 5. *Find the dimensions of the rectangle with maximum area that can be inscribed in a circle of radius 10.*

Problem 6. *A container with square base, vertical sides, and an open top is to be made from 1000 ft^2 of material. Find the dimensions of the container with greatest volume.*

Problem 7. *A box with square base is taller than it is wide. In order to send the box through the U.S. mail, the height of the box and the perimeter of the base can sum to no more than 108 in. What is the maximum volume for such a box?*

Problem 8. *A church window consisting on a rectangle topped by a semicircle is to have a perimeter p. Find the radius of the semicircle if the area of the window is to be maximum.*

Problem 9. *An offshore oil well is located at a point W that is 5 km from the closest point A on a straight shoreline. Oil is to be piped from W to a shore point B that is 8 km from A by piping it on a straight line under water from W to some shore point P between A and B, and then on to B via pipe along the shoreline. If the cost of laying pipe is \$1,000,000/km under water and \$500,000/km over land, where should the point P be located to minimize the cost of laying the pipe?*

Problem 10. *Find the radius and height of the right circular cylinder of largest volume that can be inscribed in a right circular cone with radius 5 inches and height 10 inches.*