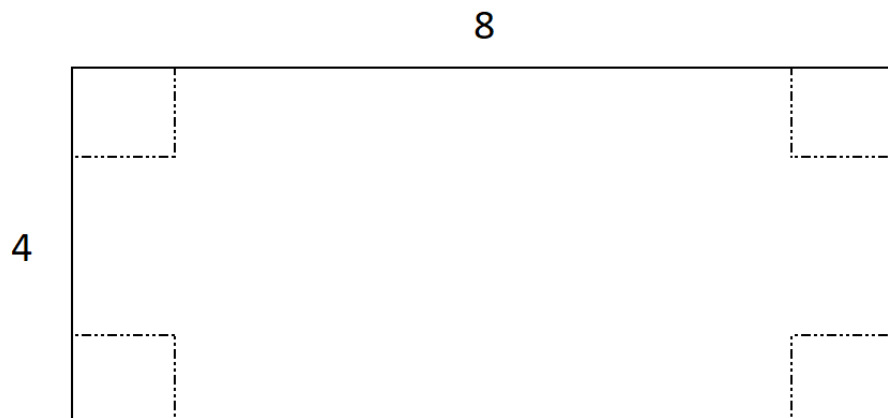Four Sample Optimization Problems (Solutions Follow)

1. A rectangular piece of tin is 4 in by 8 in. A square is cut from each corner and the edges folded up to make a box with an open top. See figure. Find the size of the square which will produce a box with maximum volume.

8

4

2. A sheet of tin is 8 cm square. A square is cut from each corner and the edges are folded up to make a box with an open top. See figure. Find maximum volume such a box can enclose.

8

x    x
x          x

8

x          x
x    x
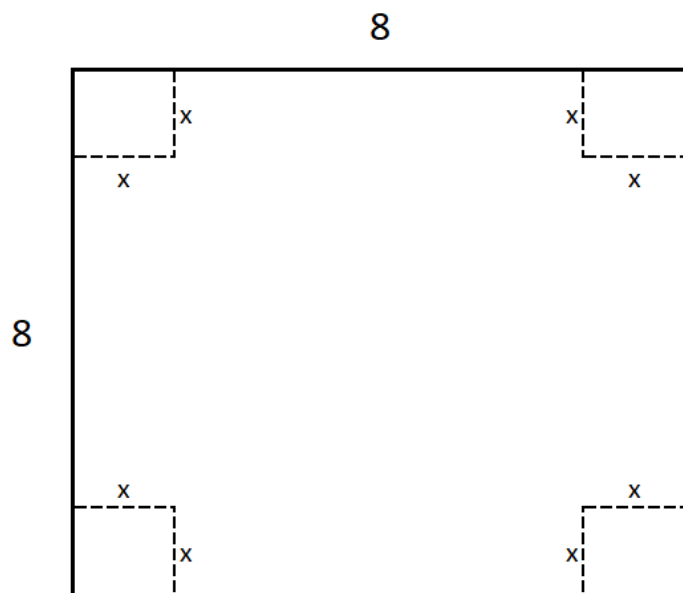
3. A farmer wants to fence a garden area as shown. Fence is required only as indicated with solid black lines in the figure. The amount of fence available is 72 meters. What is the maximum amount of surface area which may be enclosed?

SIDE OF BARN
NO FENCING IS REQUIRED HERE ↓

↓

y

y

y

y

No fencing is
↓ required here ↓

x          x

y

y

x
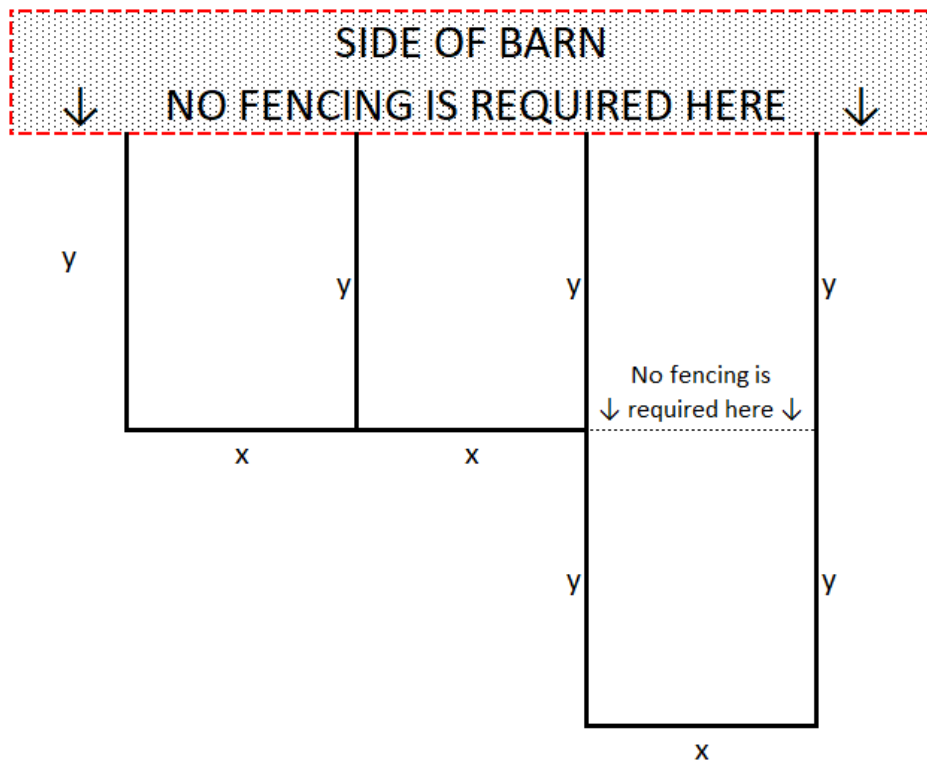
4. A builder wishes to construct five rectangular dog pens around the corner of a barn as indicated in the figure. No fencing is required along the side of the barn. If the amount of fencing available is 60 meters, what is the maximum surface area that can be enclosed, and what dimensions should each pen be to enclose the maximum area?

x

BARN NO FENCING IS
REQUIRED HERE

←

y

x

↓      ↓      ↓

y      y      y      y      y

x      x      x      x