1. Wyatt wants to build an oblong (i.e., rectangular) hollow wooden box that is to be twice as long as it is wide. If the volume of the box is to be 6 cubic feet, what height, width, and length of the box will minimize the amount of wood he uses?

   (a) Give variable names to all of the quantities in the problem, and write down equations relating the different quantities in the problem. Draw a picture of the problem if it seems relevant.

   (b) Identify the quantity you want to minimize or maximize; any other equations are probably constraints.

   (c) Use the constraints to reduce the min/max equation to a one-variable equation.

   (d) Solve the one-variable min/max problem to finish the problem.

2. Jia-Yao wants to build a rectangular fence around her property, on its north, east, south, and west sides. Because of extremely strange zoning laws where Jia-Yao lives, fence running in the east-west direction costs 3 times as much as fence running in the north-south direction. What are the dimensions of the least expensive fence that Jia-Yao could build that encloses 6 square miles of property?

   (a) Give variable names to all of the quantities in the problem, and write down equations relating the different quantities in the problem. Draw a picture of the problem if it seems relevant.

   (b) Identify the quantity you want to minimize or maximize; any other equations are probably constraints.

   (c) Use the constraints to reduce the min/max equation to a one-variable equation.

   (d) Solve the one-variable min/max problem to finish the problem.

3. Which two nonnegative real numbers whose sum is 24 will minimize the sum of the cube of one number and the square of the other?

   (a) Give variable names to all of the quantities in the problem, and write down equations relating the different quantities in the problem. Draw a picture of the problem if it seems relevant.

   (b) Identify the quantity you want to minimize or maximize; any other equations are probably constraints.

   (c) Use the constraints to reduce the min/max equation to a one-variable equation.

   (d) Solve the one-variable min/max problem to finish the problem.