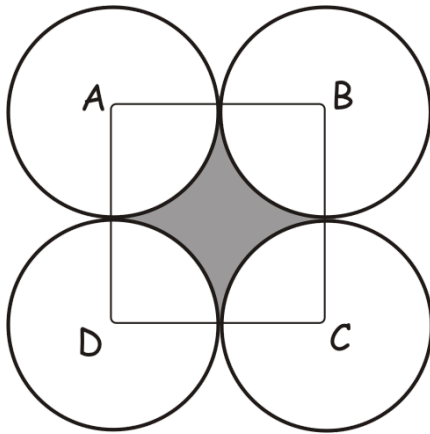


# Programming Exercise: Problem Solving with the Algorithm design Worksheet

## The problem



Farmer John has four fields of soybeans planted. There are three months left until harvest time, and the almanac has forecast a very dry summer. Farmer John has decided to put in a new, more efficient irrigation system to water his soybean crops. His estimate is that the new system will cost about \$10,000. Since soybeans are going for about \$12.75 a bushel, Farmer John wants to harvest as many bushels of soybeans as he possibly can. As he ponders on this

problem, he sketches a map of his soybean fields that shows how the irrigation system will cover the crops. This is shown on the left.

The square ABCD has its vertices located at the centers of four identical circles, which are the regions covered by the new circular irrigation system. Farmer John is intrigued by the pattern shown in the shaded region of the map, and wonders what the area of this shaded region is. The problem you have to solve is to compute the area of this shaded region.

## Deriving the Solution

Follow the model outlined in this week's slides to develop an algorithm to solve this problem. Use the Algorithm Design Worksheet as a guide, filling out the appropriate sections as you go. These steps include gathering all of the important facts about the problem, analyzing the problem, deriving an equation for the shaded area, developing a step by step approach to solving the problem, drawing an activity diagram, and deriving the solution by hand so that you can test to see if your program works.

Note that the only data that you need to solve this problem is the radius of one of the crop circles. You can calculate everything else that you need, given the radius of one of the circles. Let the user enter a value for the radius when the program runs.

If you get stuck on this problem, try posting your question to the forum.