

Project: Puzzling Inequalities

For use with Chapter 3

OBJECTIVE Create and solve puzzles using systems of inequalities.

MATERIALS Graph paper, colored pencils

INVESTIGATION In this project, you will create a puzzle by making a drawing, and then providing clues to classmates so that they can recreate your drawing.

Background To create your clues, you will need to find a system of inequalities that defines a given polygon-shaped region in the plane. To find the inequality corresponding to one side of a polygon, first identify two points on the side (usually vertices of the polygon). Then find an equation of the line containing the two points. Finally, change the equals sign to a \leq or \geq sign, as appropriate.

1. Create a drawing by shading several polygons in the coordinate plane. You can use a different color for each polygon, if desired. The vertices of each polygon should be grid intersections, and each polygon should be a relatively simple shape that could represent the feasible region for a linear programming problem. Keep your drawing secret from the other students in your class.
2. Find a system of inequalities corresponding to each polygon you drew. For each system of inequalities, write down the correct color for the shading. You've designed a puzzle!
3. Check your work by solving your own puzzle. By graphing each system of inequalities in the correct color, you should be able to recreate your original drawing.
4. Now exchange puzzles with other students in your class. Solve another student's puzzle by graphing systems of inequalities.
5. See if your drawing matches the other student's solution.

PRESENT YOUR RESULTS In addition to giving your own puzzle and its solution, write an evaluation of the puzzle you solved. Give suggestions for improvement, if you have any. What general advice would you give to someone who is trying to create a puzzle?