IN DISCRETE MATHEMATICS

Using Discrete Mathematics in the Classroom

Issue #6 *Spring/Summer 1995*

Speaking Discretely...

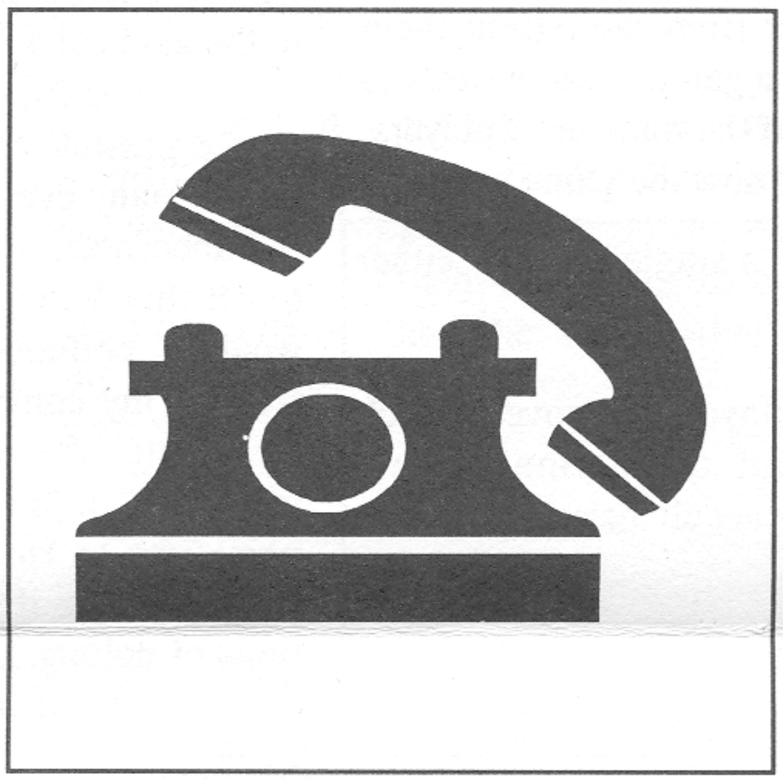
by Deborah S. Franzblau

This summer marks the beginning of a new phase of the *Leadership Program in Discrete Mathematics*, which will focus on K-8 teachers. We hope you will encourage K-8 teachers from your district to join the program next year (see flyer on p. 11).

The lead article in this issue (p.1) is on the branch of mathematics known as "game theory", which has many applications, not only to actual games of strategy such as checkers or bridge, but to political "games" such as arms treaty negotiations or elections. A list of books for further reading is included on p. 9. The classroom activity on p. 2 is a nice introduction to paradoxes in cooperative games with many players.

I am pleased to announce a new column, *The Discrete Reviewer* (p.7), edited by Janice Kowalczyk, containing capsule reviews of teaching resources (books, videos, software, etc.). The focus in this issue is on graph coloring, complementing an article giving the perspective of four teachers on using coloring in the classroom (p. 4). Coloring is also the theme of one of the picture puzzles on the back page (another new feature in this issue).

On p. 5, a teacher describes her novel method for teaching students the idea of an algorithm. Rounding out the issue is a report on implementing fair division in middle school (p. 3), and an interesting discussion on "decoding" area codes (p. 5).



In This Issue

Game Theory In The News

by Joseph Malkevitch

I just heard on the radio that the midtown tunnel is jammed—should I use the uptown bridge to get where I am going? Or should I head for the midtown tunnel because everyone else will head for the bridge? Should I vote for my favorite candidate among the three running for President even though the polls say that my candidate can't win? Or am I just throwing away my vote? Public health officials now recommend that all children get vaccinated against measles, but I know that some children have an allergic reaction to the vaccine. Can't I assume that, since so many other people will vaccinate their children, any one child has little chance of getting the measles, and that I can safely keep my children unvaccinated?

We all face such strategic questions daily as part of modern living. In fact, questions of this kind can be analyzed from a mathematical point of view. Each of these questions involves a group of individuals, each of whom can take different courses of action, who are trying to decide which action is best or optimal for themselves, given some knowledge of the consequences—which depend on the actions taken by others. Such situations turn out to have many things in common with such games as chess or poker; the branch of mathematics concerned with these problems is called *game theory*. The three problems mentioned in the introduction can be modeled as many-person games which are "paradoxical" in that "rational behavior" can lead to irrational results.

Although mathematical game theory has been developed at least since the 1920's, its application to social and economic problems was spurred by the work of Oskar Morgenstern and John Von Neumann in the '40s [1], which inspired a great deal of further activity in the '50s.

(Continued on page 8)