THE REGULAR MEETING OF THE IOWA SECTION
MATHEMATICAL ASSOCIATION OF AMERICA

The 60th regular meeting of the Iowa Section, MAA, was held at Grinnell College, Grinnell, Iowa, on April 27, 1973. Chairman Joseph Hoffert presided. Total attendance was 77, including 42 members of the Association.

Following the invited address, Consequences of Continuity, by Ralph P. Boas, Northwestern University, and Governor Hogg's report, the business meeting was held. Reports of the Articulation Committee and the Visiting Lecturer Program were given. The following motions were passed:

(1) The Iowa Section continue the Visiting Lecturer Program for another year.

(2) The revised By-Laws for the Iowa Section be recommended to the Board of Governors for approval.

Donald Pilgrim, Luther College, Decorah, Iowa, was elected as Chairman-Elect.

The following contributed papers were given at the morning session.

1. Krasnoselski's Theorem on the Real Line, Donald F. Bailey, Mt. Vernon.

   In 1955, Krasnoselski proved the following theorem. Theorem: If K is a convex, closed, bounded subset of a uniformily convex Banach space and if f is a mapping of K into a compact subset of K such that $f(x)-f(y)$ $x - y$, then the sequence obtained by choosing x_1 in K and defining $x_{n+1} = \frac{1}{2}(f(x_n) + x_n)$ converges to some z in K and $f(z) = z$.

   In this paper we give an extremely simple proof for the special case in which K is a closed interval on the real line.

2. Rings whose Ideals Form a Chain, E. T. Hill, Mt. Vernon. A well known group theory result states that a finite group is a cyclic p-group iff the lattice of subgroups is a chain; we examine the corresponding result for rings. This author has previously shown (Proc. Amer. Math. Soc., 25, No.4 (1970) 811-815) that the ideals of the modular group ring of a cyclic p-group form a chain. The converse is given in the following: Theorem: Let A be an algebra over Z_p with unity. If the exponent of the radical is of the proper form and the radical powers form a chain of maximal length, then A is the modular group ring of a cyclic p-group.

3. Solution of some Practical Potential Flow Problems by Means of Nonorthogonal Expansions, Don Kirkham and M. Sami Selim, Ames. Using the Gram-Schmidt orthonormalization method to develop a nonorthogonal expansion process, it is shown that analytical solutions for a wide class of potential flow problems may be obtained. The method is particularly useful for flow regions of arbitrary shape and also for situations where bouddary conditiond of the mixed type may occur. As an application, the method is used to derive solutions for the following problems:
(1) Electroststic field and capacity of a conducting disc centered in a finite conducting sphere.
(2) Potential flow for drain tubes surrounded by a gravel envelope.
(3) Potential flow into circumferential openings in circular tubes.
Tabulated numerical results from these solutions have direct applications.

4. Some Applications of the Alternating-Direction Implicit Method to Water Infiltration Problems, H. M. Selim and Don Kirkham, Ames. Water infiltration in two-dimensional flow regions (unsaturated soils) is solved by use of a finite difference approximation and the Alternating-Direction Implicit (ADI) method. The ADI method utilizes two simultaneous systems of difference equations that represent the partial differential equation describibg water infiltration. The solution of the problem is given by alternate use of the two systems of difference equations. The ADI method is used to solve the problem of water infiltration for four geometries of the flow region, two boundary conditions, and for two soils. From the numerical results obtained we conclude that the ADI method, which is 7 to 25 times faster than some other methods, proves flexible for changes in geometry and boundary conditions of the flow region; and valuable for use with modern digital computers to solve water infiltration problems.

5. What is Wrong With Current Mathematical Education?, R. F. Keller, Ames. When one listens carefully to statements of what is wrong with math education he hears over and over again that the student doesn't acquire the capability to do the things we want him to be able todo. He only becomes partially able to do what we want. This leads meto believe that the basic problem with math instruction is that- - -
our our "instruction processes" allow (or possibly insure) partial understanding by the student and the level of this understanding is so low that, with few exceptions, it is practically useless. The solution to this problem can only come through developing beter "instruction processes". Such processes involve the instructor and student as well as mathematical concepts. A basic foundation for developing "concept sensitive" instruction processes is developed. This is done through illustration of hoq attempts to up-grade math instruction have failed because of improperly based instruction.

6. Teaching as an Aid to Research, D. E. Sanderson, Ames. Research oriented professors often justify their emphasis with the claim that "good researchers make the best teachers". Others who are less (or anti-) research oriented claim with as much or more vehemence that research and good teaching are incompatible. As in most such disagreements, the truth probably lies somewhere in between. The thesis of this discussion is that in fact there is a symbiotic relationship between the two so that each benefits from the other. The emphasis here is on the feedback from teaching to research since that seems to be the most novel and least documented concept. Examples are cited from the author's experience and from that of some associates.