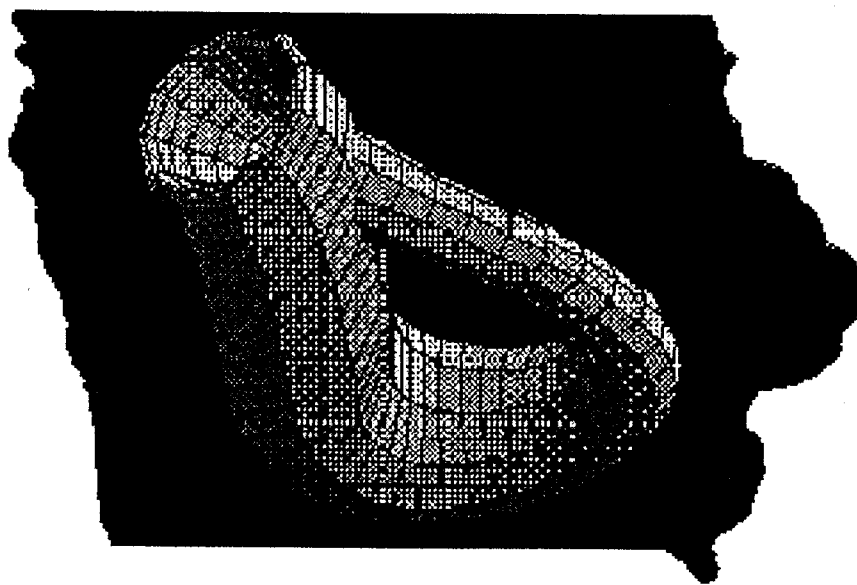# Iowa
Section
Newsletter

Spring 2000

Iowa Section -- Section Officer List

Chair:

David Manderscheid
Department of Mathematics   david-manderscheid@uiowa.edu
University of Iowa   Voice: 319-335-0763
Iowa City, IA 52242-1419   FAX: 319-335-0627

Past-Chair:

Ruth Berger
Department of Mathematics   bergerr@luther.edu
Luther College
700 College Drive   Voice: 319-387-1174
Decorah, IA 52101-1043   FAX: 319-387-1088

Chair-Elect

Bruce Sloan
Department of Mathematics   sloan@simpson.edu
Simpson College   Voice: 515-961-1837
Indianola, IA 50125   FAX: 515-961-1498

Secretary/Treasurer:

Mark Johnson
Dept of Mathematics   johnsonm@central.edu
Central College   Voice: 515-628-5163
Pella, IA 50219

Governor and
Math Contest Chair:

Elgin Johnston
Department of Mathematics   ehjohnst@iastate.edu
Iowa State University   Voice:
Ames, IA 50011-0001   FAX: 515-294-5454

Student Chapter Coord:

Catherine Gorini
Dept. of Mathematics   cgorini@mum.edu
Maharishi Univ. of Management   Voice: 515-472-1107
1000 North Fourth Street   Voice Mail: 515-472-1228, Box 9066
Fairfield, IA 52557-1066   FAX: 515-472-1123

Newsletter Editor:

Cal Van Niewaal
Dept. of Mathematical Sciences cvanniew@coe.edu
Coe College
1220 First Avenue NE   Voice: 319-399-8642
Cedar Rapids, IA 52402-5092   FAX: 319-399-8557

Public Info. Officer
and Webmaster:

R. B. Campbell
Department of Mathematics   campbell@math.uni.edu
Univ. of Northern Iowa   Voice: 319-273-2447
Cedar Falls, IA 50614-0441   Msg: 319-273-2631

MAA Departmental
Liaison Coordinator:

Alex Kleiner
Dept. of Math and Comp Sci   Alexander.Kleiner@drake.edu
Drake University
2507 University Ave   Voice: 515-271-3041
Des Moines, IA 50311   FAX: 515-271-2055

VOLUME XVI   No. 2   March 2000

Joint Meetings - Iowa MAA, ASA, and IMATYC
Simpson College, Indianola, Iowa
April 14 and 15, 2000

Friday, April 14

1:00 - 4:30	Registration and Book Exhibit	Carver Atrium
2:00 - 3:00	ASA Session I	Carver 340
2:00 - 3:00	Mathematics Student Papers I	Carver 205
3:00 - 3:30	Break	Carver Atrium
3:30 - 4:30	Mathematics Student Papers II	Carver 205
3:30 - 5:00	ASA Session II	Carver 340
4:30 - 5:00	MAA Liaisons Meeting	Carver 205
5:30 - 7:30	ASA Dinner	College Hall
	All Participants Welcome	Matthew Simpson Room
	RESERVATIONS REQUIRED	

Or Dinner on Your Own

7:45 - 8:45	MAA Lecture I	Carver 215
	Deanna Haunsperger, Carleton College	
	Department of Mathematics	
	"The Paradoxical Nature of Voting"	
8:45 - ?	Reception and Social Hour	Carver Atrium
	Honoring the retirement of Ed Hill	
	Hosted by Cornell College	

Saturday, April 15

8:00 - 3:30	Registration and Book Exhibit	Carver Atrium
8:30 - 9:30	ASA Keynote Speaker	Carver 215
	Michael O'Fallon, Mayo Clinic	
	President of ASA	
	"The Breast Implant Controversy:	
	A Statistician meets the Legal Profession"	
9:30 - 10:00	Break	Carver Atrium
10:00 - 11:00	MAA Lecture II	Carver 215
	Stephen Kennedy, Carleton College	
	Department of Mathematics	
	"Two Heads are Better Than None"	
11:00 - 11:45	MAA Business Meeting	Carver 215
12:00 - 1:00	MAA Luncheon	College Hall
	All Participants Welcome	Matthew Simpson Room
	RESERVATIONS REQUIRED	
12:00 - 1:00	IMATYC Luncheon	College Hall
	and Business Meeting	Red and Gold Room
	RESERVATIONS REQUIRED	

Or Lunch on Your Own

1:00 - 3:00	Mathematics Computer Workshop	Carver 233
1:00 - 4:00	Mathematics Contributed Papers I	Carver 205
1:00 - 4:00	Mathematics Contributed Papers II	Carver 231
1:30 - 3:30	ASA Session III	Carver 340

Friday Afternoon Sessions

Mathematics Student Papers I
Carver Science Hall, Room 205

2:00 - 2:15   Ian Besse, Grinnell College
A Qualitative Investigation of the Discretized Lorenz System

2:20 - 2:35   Kari Meyering, Drake University
A Look Into Apportionment and Voting Power at Drake University

2:40 - 2:55   Grace Lewis, Grinnell College
Maximum Degree and Color Extension

Mathematics Student Papers II
Carver Science Hall, Room 205

3:30 – 3:45   Jayadev Athreya, Iowa State University
Number Theory, Balls in Boxes, and the Asymptotic Uniqueness of Maximal Discrete Order Statistics

3:50 – 4:05   Rob Park, Grinnell College
Coloring Extensions of Planar Graphs

4:10 – 4:25   Micah James, Wartburg College
The Stone Balance Problem

Saturday Afternoon Sessions

Mathematics Computer Workshop
Carver Science Hall, Room 233

1:00 - 3:00   Gene Herman, Grinnell College
Maple6 and Linear Algebra

Mathematics Contributed Papers I
Carver Science Hall, Room 205

1:00 - 1:25   Eric Canning, Morningside College
The Interpretation of the Lambdas of Lagrange Multipliers

1:30 - 1:55   Charles Jepsen, Grinnell College
Quadrilaterals with Integer Sides

| 2:00 - 2:25 | Mark Chamberland, Grinnell College |
| | *The History and Current Status of the Collatz Conjecture* |

| 2:30 - 2:55 | Leon Tabak, Cornell College |
| | *A Parable of Computational Geometry* |

| 3:00 - 3:25 | Rick Spellerberg, Simpson College |
| | *A Look at Subposets of Noether Lattices* |

| 3:30 - 3:55 | Round Table Discussion for MAA Student Chapter Advisors |
| | Organized by Cathy Gorini, Maharishi University of Management |

Mathematics Contributed Papers II
Carver Science Hall, Room 231

| 1:00 - 1:25 | Scott R. Herriott, Maharishi University of Management |
| | *Update on College Algebra Reform* |

| 1:30 - 1:55 | A. M. Fink, Iowa State University |
| | *There Should be a Cubic Solver in Your Life* |

| 2:00 - 2:25 | Steve Nimmo, Morningside College |
| | *The Marriage of College Algebra and Physical Science* |

| 2:30 - 2:55 | Murphy Waggoner, Simpson College |
| | *Maple Laboratory in Calculus III and Differential Equations* |

| 3:00 - 3:25 | Dave L. Renfro, Drake University |
| | *Some Nonconstructive Existence Proofs* |

| 3:30 - 3:55 | Al Hibbard, Central College |
| | *Illustrating Functional Programming with Mathematica* |

No information on the ASA Sessions was available when this newsletter went to the printer. Please check the Iowa Section website for updated information:

http://www.maa.org/iowa

Abstracts

Computer Workshop:

Maple6 and Linear Algebra
Gene Herman, Grinnell College   herman@math.grinnell.edu

Get an early hands-on look at the new Maple6 with its completely rewritten Linear Algebra package. This package is the major change from MapleV, Release 5.1, to Maple6, and it offers exciting opportunities for teaching and learning Linear Algebra. Not only is the new package much easier to use than the old one, but it has much stronger numerical capabilities that come from the alliance between Maple and NAG, the Numerical Algorithms Group.

The presenter is a Maple6 beta tester and coauthor of "Linear Algebra: Modules for Interactive Learning Using Maple." This is a book and CD to be published this fall by Addison Wesley Longman that will exploit the new Maple6 Linear Algebra package. The book and CD will contain 28 Maple worksheets (i.e., "modules") that cover the topics in a standard first course in linear algebra. Instructors can use these modules as frequent or occasional labs in a linear algebra course, or they can use the entire collection as the sole textbook in a lab-based version of the course. Workshop participants will be able to use the new Linear Algebra package and preview a sampling of the 28 modules.

Although the workshop will be designed for faculty who have had some previous exposure to Maple, all are welcome. If you have questions, contact the presenter directly: herman@math.grinnell.edu or 515-269-4202.

Mathematics Contributed Papers:

The Interpretation of the Lambdas of Lagrange Multipliers
Eric Canning, Morningside College   epc002@morningside.edu

When using the method of Langrange multipliers in optimization problems, the values of the lambdas are often found but then discarded. To quote from a popular calculus text, "The associated values of lambda may be revealed as well but often are not of much interest." It turns out that the lambdas do have meaning. In particular, each lambda is equal to the change in the optimal value of the function with respect to the condition imposed on the constraint associated with that particular lambda.

The History and Current Status of the Collatz Conjecture
Marc Chamberland, Grinnell College   chamberl@math.grin.edu

The Collatz Conjecture, also widely known as the 3x+1 problem, is a very easily-stated problem which has withstood a solution for fifty years. In this talk I will give an overview of the work done on this problem, including approaches from the areas of number theory, functional equations and dynamical systems.

There Should be a Cubic Solver in Your Life
A. M. Fink, Iowa State University   fink@math.iastate.edu

Part of the undergraduate curriculum should include education in the best sense, that of imparting the culture of our discipline and the connections between various areas. Cubic solvers can be talked about in at least three different courses, each with a different emphasis, and each teaching something about the subject.

Round Table Discussion for MAA Student Chapter Advisors
Cathy Gorini, Maharishi University of Management   cgorini@mum.edu

Come share your successes, ideas, and questions about MAA Student Chapters and other forms of math clubs. Information about starting MAA Student Chapters as well as Pi Mu Epsilon chapters will be available.

Illustrating Functional Programming with Mathematica
Al Hibbard, Central College   hibbarda@central.edu

In this talk, we will see how to use some of the interesting Mathematica constructs that accomplish functional programming. These include Map, Apply, Nest, Fold, NestWhile, and others. Each of these will be used to illustrate various mathematical concepts (eg, subgroup generated by an element).

Note: No previous Mathematica experience is required.

Update on College Algebra Reform
Scott Herriott, Maharishi University of Management   herriott@mum.edu

This presentation will review the discussions on college algebra reform that were held at the national MAA meetings in 1999 and 2000. Topics include the motivations for reform, the directions that new textbooks are taking, issues in implementing reform, and efforts to get federal support for a national conference on college algebra reform.

Quadrilaterals with Integer Sides
Charles Jepsen, Grinnell College   jepsen@math.grin.edu

There are known formulas for the number of triangles with integer sides and prescribed perimeter. If one wishes to count the number of such quadrilaterals, restrictions are needed since a quadrilateral is not uniquely determined by its four sides. We find counting formulas for two special cases: a) cyclic quadrilaterals, and b) trapezoids.

The Marriage of College Algebra and Physical Science
Steve Nimmo, Morningside College   sdn001@alpha.morningside.edu

We are in the fifth semester of teaching a course called Math in the Physical World. This is a course in the interdisciplinary portion of our new core curriculum. It was developed by the mathematics and physics professors at Morningside College. In this talk, I will discuss how the course came to be, some of its strengths and some of the pitfalls.

Some Nonconstructive Existence Proofs
Dave L. Renfro, Drake University   dlrenfro@pop.gateway.net

A survey of some interesting nonconstructive existence proofs.

A Look at Subposets of Noether Lattices
Rick Spellerberg, Simpson College   speller@simpson.edu

In 1962, R. P. Dilworth introduced Noether lattices as an abstraction of the lattice of ideals of a commutative Noetherian ring. Noether lattices form one of the most important classes of multiplicative lattices. In this presentation I will focus on the subposets of regularly generated, regular, and faithful elements of a Noether lattice L, (L_{rg}, L_r, L_f). Similarities with the analogous terms in $L(R)$, the lattice of ideals of a commutative Noetherian ring are discussed.

A Parable of Computational Geometry
Leon Tabak, Cornell College   l.tabak@ieee.org

A Voronoi diagram is a solution to the Post Office Problem: given the location of all post offices in a country, divide the country into regions such that every house within a region is closer to the single post office in its own region than it is to any other post office. This problem asks for an assignment of responsibilities to post offices. The solution sensibly has each house receiving mail from the closest post office.

A post office becomes a model in the more general description of the problem. Scientists working in many disciplines, including crystallography, meteorology, botany, and zoology, have repeatedly rediscovered this problem in its many guises over the course of the last hundred years. However, only in the past quarter century have mathematicians devised fast methods for drawing Voronoi diagrams.

Three approaches to the solution of the Post Office Problem each improve upon its predecessor and illustrate general principles that apply in many domains. In turn, these algorithms compare everything to everything, divide and conquer, and add a dimension to the apparently two dimensional problem. The speaker will construct a solution to an instance of the Post Office Problem, discuss the problem's relevance to other questions, and point to relevant literature and software now available on the web.

Maple Laboratory in Calculus III and Differential Equations
Murphy Waggoner, Simpson College   waggoner@simpson.edu

In 1997 the Simpson Mathematics Department received an NSF ILI grant to develop a computer laboratory component in the Calculus III and Differential Equations courses. This talk outlines the work to develop the laboratory component including the structure of the new course, the choice of laboratory assignments, and the instructional philosphy.

Mathematics Student Papers:

Number Theory, Balls in Boxes, and the Asymptotic Uniqueness of Maximal Discrete Order Statistics
Jayadev S. Athreya, Iowa State and
Lukasz Fidkowski, Michigan Tech REU   jayadev@iastate.edu

The abstract for this paper was not available when this newsletter went to the printer. Please check the Iowa Section website for updated information.

A Qualitative Investigation of the Discretized Lorenz System
Ian Besse, Grinnell College   besse@grinnell.edu

The Lorenz equations are a system of three nonlinear coupled differential equations which model convection that have been extensively studied since 1963. Though much is known theoretically about the periodic structure within the Lorenz attractor, and of its fractal nature, little has been accomplished in uncovering that structure and calculating the exact fractal dimension of the Lorenz attractor. These open questions were the compulsion behind the investigation I conducted on the periodic behavior present in the Euler discretization of the Lorenz system. Periodic behavior for a variety of time-steps was cataloged and analyzed in hopes that as the time-step tended to zero, periodic structures in the discrete case might approach periodic structures in the continuous case. Ultimately the intention was to determine if identifying a sufficient number of periodic orbits on the Lorenz attractor, would yield insight into possible methods for obtaining the fractal dimension of the attractor. Although computational constraints hindered analysis of cycles of length greater than two, much was discovered about the behavior of the system's two-cycles as the time-step was varied and also about appropriate methods and equipment necessary for a study of this nature.

The Stone Balance Problem
Micah James, Wartburg College   jamesm@wartburg.edu

The Stone Balance problem is one wherein a 40 pound stone has been broken into four pieces. The weights of the smaller stones have the special property that, when used on a simple balance, one can balance any integer weight from 1 to 40 pounds. Included is an algorithm for determining the necessary positions of stones for a given weight along with a generalization to accommodate non-simple balances. Explored as well is a way to easily explore variations of the problem with generating functions and Maple.

Maximum Degree and Color Extension

Grace Lewis, Grinnell College   lewisg@grinnell.edu

I discuss the question of how maximum degree and color extension are related. The coloring extension problem concerns taking certain vertices or cliques in an r-colorable graph G and pre-coloring each of them with one of $r+1$ colors. If these vertices or k-cliques are a distance of $4k$ or more apart, then Kostochka showed that any pre-coloring extends to an $(r+1)$-coloring of G. This paper investigates whether or not putting a bound on the maximum degree of G can reduce the distance pre-colored vertices must be apart to guarantee a color extension. Results include new critical distances for graphs where the maximum degree is less than or equal to the chromatic number of G, and graphs where the maximum degree is one more than the chromatic number of G.

A Look Into Apportionment and Voting Power at Drake University

Kari Meyering, Drake University

The Student Athletic Advisory Board at Drake is currently a "one team, one vote" committee. A more representative committee might be beneficial to the student-athletes and Drake University. This possible change in apportionment and its influence on voting power will be explored.

Coloring Extensions of Planar Graphs

Rob Park, Grinnell College   parkp@grinnell.edu

Suppose that P is a subset of the vertices of a graph G with chromatic number r, where P induces a set of k-cliques and all of the vertices of P are precolored. There exists a finite critical distance so that for any graph, if the k-cliques are at least this distance apart, then any $(r+1)$-coloring of P will extend to an $(r+1)$-coloring of G. In this talk, I will describe several results found while looking for such a critical distances for planar graphs. I give an example of a planar graph in which a certain precoloring of P does not extend to a coloring of G. This example gives a lower bound for a critical distance. I will also look at upper bounds for this critical distance.

General Information

Registration Information: Registration will be at the meeting. The registration desk and book display will be in the Atrium of Carver Science Hall. The fee is $5 for regular members, free for students. Tickets for the MAA luncheon are $8.50. Tickets will be available at the registration desk, but reservations must be made for the MAA luncheon by April 10. (See next page for more information.)

Directions and Parking: If traveling from the north or east, take highway 65/69 south from Des Moines to Indianola. Turn west on Clinton Street for three blocks to reach Buxton Street and Carver Science Hall. If traveling from the south or west, take exit 56 on I-35 to go east on highway 92. When you reach Indianola, go north on B Street to Clinton and Carver Science Hall.

Parking is available at several sites on the Simpson campus including a lot just west of Carver Science Hall (Clinton and C Street).

Friday Evening Reception: The Friday evening reception and social hour is being hosted by Cornell College in honor of Ed Hill. Ed will be retiring at the end of the current academic year after 31 years as a member of the faculty at Cornell.

MAA Liaisons Meeting, Friday 4:30 p.m., Carver, Room 205:
The Mathematical Association of America's liaison program is intended to provide a contact person at each institution. A list of the current liaisons for the institutions in Iowa can be found on the Iowa Section web page
http:// maa-ia.cornell-iowa.edu / Liaisons.htm
This session will be an opportunity for liaisons to meet each other and discuss the role of the liaisons in their home institutions, in the Section and in the Association. Cal Van Niewaal will give a report on the liaison's breakfast at the winter meetings in Washington, D.C. All institutions are encouraged to send a representative to this session, especially those which do not currently have a liaison. This meeting is being organized by Alex Kleiner, Departmental Liaison Coordinator for the Iowa Section.

ASA Dinner (Friday): No information was available when the newsletter went to the printer. Check the website for updated information.

MAA Luncheon (Saturday): There will be a luncheon Saturday for all meeting participants. It will be held in the Mathew Simpson Room of College Hall, just north of Carver Science Hall. The menu is a buffet including Hawaiian ham steaks, vegetarian lasagna, two vegetables, buttered potatos,dessert, and beverages. Tickets are $8.50 per person. Advance reservations are required. To reserve a ticket for the luncheon, contact Darlene Day (515-961-1830 or dayd @ simpson.edu) by **April 10**. Those making advance reservations may pick up their tickets at the time of registration.

IMATYC Luncheon and Business meeting (Saturday): No information was available when the Newsletter went to the printer. Check the website for updated information.

Lodging in Indianola

Apple Tree Inn North side of Indianola on Hwy 65/69, 1 mile from campus
Single: $45 plus 10% tax
Double: $50 plus 10% tax
Phone: 1-800-961-0551

Super 8 North side of Indianola on Hwy 65/69, 1.2 miles from campus
Single: $47.85 plus 10% tax ($55.88 plus 10% tax for two)
Phone: 515-961-0058

Woods Motel South side of Indianola on Hwy 65/69, 1 mile from campus
Limited number of rooms available at $31-$40 plus 10% tax
Phone: 515-961-5311

Lodging in Des Moines

There are many options in the Des Moines area. Below are several near the airport (Army Post Road and Fleur Drive), approximately 15-18 miles from Indianola:

Heartland Inn Airport Phone: 515-256-0603 or 1-800-334-3277
Motel 6 Airport Phone: 515-287-6364 or 1-800-4MOTEL6
Best Western Airport Inn Phone: 515-287-6464
Hampton Inn Airport Phone: 515-287-7300
Holiday Inn Airport Phone: 515-287-2400 or 1-800-248-4013

Questions?
Contact Bruce Sloan (Iowa MAA Chair-Elect) at *sloan @ simpson.edu*

Iowa Section MAA -- Nominating Committee Report

The Iowa Section Nominating Committee (Ruth Berger, Alex Kleiner, and Stephen Willson) has submitted the following nominations. The election will be held at the business meeting at the Simpson College on Saturday, April 15, 2000.

Chair Elect:
Luz DeAlba Drake University
Joel Haack University of Northern Iowa

Luz Maria DeAlba, Professor of Mathematics and Computer Science, has been at Drake University since 1984. She received a MS degree in 1980 from Iowa State University and a Ph.D. (also from Iowa State University) in 1984. Her research interests are in Linear Algebra and Matrix Theory. Her experience using technology to teach linear algebra has led to an invitation to serve on the International Linear Algebra Society Education Committee. DeAlba was Chair of the Department of Mathematics and Computer Science at Drake from 1997 to 1999.

Joel Haack received his BS, MAs (one each in Mathematics and in Statistics), and PhD from the University of Iowa. Haack taught at Oklahoma State University (1979-1991) and has been Head of the Department of Mathematics at UNI since 1991. He began his professional career in non-commutative ring theory, but has recently been most active in the relationships between mathematics and the arts and humanities. His teaching assignments have run the gamut from general education and precalculus service courses through the direction of doctoral theses. He is presently a Visiting Lecturer for the MAA.

Section Web Pages

It is now easier than ever to access the web pages for the various sections of the MAA. Just type the section name (or in some cases, section name abbreviation) after http://www.maa.org/ and you will be automatically forwarded to that section's site.

The Iowa Section web pages can now be accessed using:
http://www.maa.org/iowa

Treasurer's Report

Iowa Section Secretary-Treasurer Mark Johnson submitted
the following preliminary report for the year.

	Debits	Credits	Balance
Section Fund			
Starting Balance (4-16-99)			$ 2,493.88
1999 Spring Meeting:			$ 2,493.88
Vender		$ 25.00	$ 2,518.88
Registrations (53 @ $5)		$ 265.00	$ 2,783.88
Book Sales		$ 243.50	$ 3,027.38
Meals		$ 225.00	$ 3,252.38
Expenses	$ 443.44		$ 2,808.94
Books (display)	$ 187.50		$ 2,621.44
Books (nondisplay)	$ 109.00		$ 2,512.44
1999 Spring Newsletter	$ 222.70		$ 2,289.74
MAA Dues Rebate		$ 500.00	$ 2,789.74
MAA Book Sales		$ 57.85	$ 2,847.59
1999 Fall Newsletter	$ 273.41		$ 2,574.18
2000 Spring Call for Papers	$ 87.93		$ 2,486.25
Service Charge	$ 1.35		$ 2,484.90
Interest		$ 48.91	$ 2,533.81
Ending Balance (3-17-00)			$ 2,533.81
Competition Fund			
Starting Balance (4-16-99)			$ 2,160.42
Interest		$ 40.52	$ 2,200.94
Ending Balance (3-17-00)			$ 2,200.94