<u>Third North-South Dialogue</u>
Saturday June 28,2003

12:00-13:00   Coffee in Lounge, Department of Mathematics & Statistics,
           4th floor Math Science Bldg Rm. 461, Name Tags, Social

Schedule of Talks - ICT 116 Theatre

13:00-13:10   Greetings from Organizers (T. Bisztriczky, Chair of Department of Mathematics
           and Statistics, and P. Zvengrowski, Local Organizer)

13:10-14:00   Aiden Bruen, University of Calgary, *Geometry from Ancient*
           Greece to Modern Italy, from Menelaus through Ceva to Segre,
           and a Fundamental Problem of Algebraic Coding Theory

14:00-14:30   Xi Xhen, University of Alberta, *Rational Curves on*
           Hypersurfaces

14:30-15:00   Elena Braverman, University of Calgary, *On Impulsive Logistic*
           Equations and Associated Difference Equations

15:00-15:30   Coffee break, Ploughboy's - ICT Lobby

15:30-16:00   Bin Han, University of Alberta,
           Accuracy Analysis for Sigma-Delta System

16:00-16:30   Xuewen Lu, University of Calgary,
           On a Partially Linear Single-Index Survival Model

16:30-17:00   Rick Churchill, Hunter College of City University of NY,
           and University of Calgary, *Cyclic Vectors*

17:00-17:40   Michael Li, University of Alberta,
           Backward Bifurcation in a Model for HTLV-I Infection

Banquet (University Club - MacEwan Student Centre)

19:00 Banquet (menu below)
     Salads: California Greens, Seafood Pasta, Nicoise, Greek,
        Marinated Vegetable, American Coleslaw, Oriental Bean Sprouts
        Buffet: European Cold Cuts, Vegetarian lasagna, Teriyaki salmon filet
        with Grass Sauce, Relish, Crudite, Cheese, Fruit trays
        Main Course: Roast "AAA" Alberta Beef au jus Chef's Choice 2 starches and 2
        vegetables
     Wine: Castelli Romani, Colli Albani

20:30   Talks: T.Lau, T.Bisztriczky, S.Vossos, R.Woodrow, G.Margrave

21:00   Magic Presentation: P.Zvengrowski

Sunday June 29,2003

9:30-10:00   General Discussion, all participants, Department Lounge
              (Moderator: Peter Zvengrowski)

10:00-12:00   Parallel Sessions
              Discussions in 3 Sessions :

Session for Graduate Students, MS 365, Moderator: Alberto Nettel (U of C)

Session on Research in the Mathematical Sciences in Alberta, MS 325,
Moderator: Paul Binding (U of C)

Session on Alberta Post-Secondary Education, MS 371, Moderators: James
Muldowney (U of A), Gary Margrave (U of C), Jack Macki (U of A)

Education Session of N-S Meeting
June 28, 2003

A panel composed of Jack Macki, Gary Margrave and Jim Muldowney led the debate on
education issues. There was clearly considerable interest in this area and there were 19
participants. The panel thanked Steve Vossos of ASRA for his attendance at the N-S meeting
during his long weekend break and for his participation in this session. ASRA support through
PIMS and BIRS has been a key factor in the development of math collaborations and activity at
every level in the province.

Jim Muldowney reviewed the topics of the discussion at N-S in Edmonton in 2002 and
intervening progress. Three issues were raised there: research collaborations at the college and
university level, the post-secondary mathematics curriculum and schools outreach programmes.

- **Outreach and Math Fairs in Alberta**

By far the most tangible progress had been achieved in outreach in the schools. This is of course
an area that traditionally has had extensive involvement by faculty, at both U of C and U of A for
many years, with programmes such as the Alberta High Schools Prize Examination and
programmes at both campuses for interested and gifted grade school students.

Significant progress had been achieved here. In addition to maintaining the traditional areas of activity, Math Fairs are now an established part of the mathematics scene in schools throughout the province, and there is growing interest and participation by college faculties.

University and college faculties are now focusing their efforts in this area on the training of school personnel to host math fairs for their pupils. This training takes place in teacher education courses and at specially organized workshops.

A particularly useful training workshop for post-secondary faculty and schoolteachers had been organized with ASRA and PIMS assistance at BIRS. Location of the workshop at the research facility had the added benefit that the participants came to recognize their membership in a larger professional community and had a greater sense of the impact and importance of Math Fairs.

- **Research Issues**

There has been little progress in this area. It was recognized at the previous meeting that there were few incentives for college faculty to engage in research. Benefits to the universities would include a new source of co-supervision for graduate research students. Faculty who engaged in research could receive adjunct appointments at the universities and thus become eligible for research grants.

Some faculty expressed an interest in research activity as a professional interest. Easier access to library resources should be provided and joint summer research collaborations should be encouraged.

- **Curriculum**

There had been considerable interest shown in this topic at the previous meeting. There was a movement towards better exchange of information and discussion of mutual concerns on curricular issues. The meeting felt that we could usefully focus our discussion on this area since outreach appears to be progressing well and this topic shows excellent potential for useful development.

- **Discussion**

Jack Macki led the discussion, which touched on the following issues:

1. Experience with Engineering Math Programme. New initiatives in curriculum development.

2. Industrial Initiative Programme (IIP) 3rd yr. Math undergrads.

3. Encouraging new developments were taking place at SIAM
    1. Gill Strang, President and New Board of Directors showing bold new ideas
    2. SIAM Review is the flagship journal and showing a radically changed point of view
    3. Now discrete math and computers are receiving considerable emphasis

4. Propose to address 3 areas of curriculum
    1. Engineering and Applied Science
    2. Honours and Specialized Math

3. Arts Majors – Focus and evaluation differs

5. Propose BIRS sessions to review curriculum and to develop a programme that satisfies most stakeholders and modernizes the curriculum

6. Position paper focusing on challenges and ways to improve math education

7. Start with small weekend workshop in Alberta and move toward a major Western and/or Canadian curriculum; apply for BIRS in 2005 or hold at a university

8. Engineering Curriculum – Courses to be comprised of lectures, assignments and computer-based labs
   1. currently lectures, labs and home assignments
   2. sophisticated results and collegial environment is developed by all instructors (including TA-s) meeting on a weekly basis
   3. FSO prepare labs, 85 students currently in 3 labs

College Issues
Some issues of particular relevance to college faculty were raised:
9. Universities actually determine the curriculum

10. Lack of math skills of high school students

11. Poor attitude in general toward math "Math Phobia"

12. The curriculum is not necessarily what students learn and particularly remember

13. High school departmental grades are lower than the school-based grades

14. Need to be able to think mathematically and logically i.e. What is the purpose of techniques? Why do they accomplish certain tasks? How to ID situations and apply the proper techniques

15. In Alberta there is no certification required specifically for math teachers

Desirable objectives

16. Important to rectify gap in mathematics between high school and university

17. Change the "Math Phobia" attitude in high school

18. Foster greater cooperation between all post secondary institutions and high schools

19. Establish a university presence at Teacher's Convention

20. Invite Math Council and Math Curriculum representatives to N-S meeting

21. Hold Math Symposium for Math Leaders – do workshops with all post secondary instructors

22. Teacher Inservice Days with PIMS representatives conducting workshops which need to be compulsory for teachers

23. Focus on sharing lab information and tutorials and develop ways to exchange materials between post-secondary institutions
    1. Set up a "Math Resources Website"
    2. PIMS cooperation would be great

24. Develop a base of standard questions; standard labs not based upon texts
    1. Develop an exam oriented to calculators and computers and an exam excluding these

25. For arts develop a course similar to Math 160; and for social science a Stats course oriented to their needs
    1. Colleges cannot offer the variety of courses that universities carry because of funding and resources. Offer generalized courses with emphasis on the value of math. However, a generic course, designed to fit everyone, can end up fitting no one.

26. Remedial courses for weak math students but meant as an upgrade (similar to U of C)

Action Items

- BIRS Workshop in the fall strictly on curriculum

- Second BIRS Workshop in spring

- Web-based information exchange – Michael Li

Research Session

1. Communication of Activity Lists

Each institution is asked to identify a coordinator (with email address) on its website. Website information and faculty, graduate student etc. group email addresses should be exchanged via these coordinators.

Lists of upcoming activities should be sent to the above group addresses. Visitor lists (including dates, affiliations and subjects of expertise) should be posted on websites as soon as they are available.

2. Format of North-South Meeting

As the attendance at these meetings rises, the mix of interests is changing. Research professors form a smaller percentage of the audience, and the lecture programme should reflect this. It was recommended that there should be plenary talks, accessible to everyone, and also two parallel sessions, one on research topics as now, and the other perhaps on mathematics education.

Wider advertising of the meeting, e.g., to other mathematics educators, was also suggested.

3. Graduate Seminar

It was felt that the lecture programme was of great benefit to graduate students, and that a separate graduate seminar day could be run as a satellite meeting, perhaps the day before. The University Graduate Student Directors should plan such an event well ahead, encouraging supervisors to send their students.

4. Research Groups and Funding

Department Heads are encouraged to identify common research interests and potential organizers of workshops for them. Applications for BIRS 2-day workshops can be made at any time, for up to 40 people on Friday-Saturday of any particular week. There is also a 'Research in Teams' programme that can host 2-4 people for several weeks. The BIRS programmes do not include travel costs for participants, and at least one of the organizers should be a faculty member at a PIMS University (U of C, U of A, U of L).

There is a number of ways to get support through PIMS for small research activities. Funding for small workshops requiring less than $1000 to hold is fairly easy to obtain. An industrial orientation usually gives an increased chance of funding. The Pacific Northwest Seminar series will provide up to $500 per event with a simple letter and a few months lead-time. There are more details to be found on the PIMS website at www.pims.math.ca.

Minutes of the Graduate Session from the 3rd North South Meeting
June 29, 2003

Alberto Nettel introduced Roberto Bencivenga (RBENCIVENGA@RDC.AB.CA) from Red Deer College, and Bill Hackborn from Augustana University College.

RED DEER COLLEGE (RDC)

Roberto gave an introduction into what types of colleges there are and where RDC stands. He pointed out the following:
- RDC is a public college.
- RDC has 2 to 4 year programmes in many disciplines from plumbing to math.
- RDC is not a degree-granting college. Degrees obtained after studying there are granted by U of A.

- Another option is, after studying there for the first years of a Science programme, transfers are available to universities for completion of degree.
- They have a faculty of 5 in Math/Stats.

Talking about possibilities for grad students' career at this college:
In the last 2 to 3 years no positions have been opened.
Applicant should expect approx. 15 hours of teaching per week.
Expected to be available to students at most times.
Main purpose is teaching; still some research can be done.
Not a research community per se.
Many colleges have professional development programmes (Grants for conferences, updating courses, books, etc.) RDC is one of the best in Alberta in this sense.
Courses to be taught if hired: Calculus, Linear Algebra and Statistics. Before, higher level course were offered, but since transfers have been frequent then no quorum for these.
Statistics is growing; look for other departments since they are giving their own Statistics courses.
Computing Sciences has not grown as before, hence fewer positions.
Salaries vary according to experience and education, e.g. a PhD grad with experience could go as high as $78,000 a year.

AUGUSTANA UNIVERSITY COLLEGE (AUC) – Located in Camrose

Bill Hackborn (HACKW@AUGUSTANA.CA) representing AUC pointed out:
- University / Colleges have a bigger component of research-related activities than colleges but not as big as universities.
- AUC is a private institution owned by a church group.
- AUC is a degree granting institution.
- A proposal for joining AUC and U of A has been submitted. When it goes through AUC would be like a "U of A / Camrose campus". Waiting for government's seal of approval.

Regarding Careers at AUC:
- Salary levels not as high as RDC.
- Expect to teach 3 courses per term (Fall and Winter) combined with research. If no research, then 4 courses per term.
- Class sizes are smaller than those at U of A or U of C, e.g. Calculus has 40 students.
- It is common that there might be no tenure position offered as such at first. First hired as sessional and then, when a tenure position is available knowledge of the applicant's work as a sessional is an asset.

Grad Students from U of A and U of C were expected to present a **brief overview** of their research area and/or preference. Many students had prepared slide presentations (6-8 minutes per presentation) and questions. Some went overtime and not everyone got to present.
But all students were able to let everyone else know what their area of interest was.

Presentations:

- Ovidiu Voitcu (U of A) Area: Neural Networks. Applications into airplane wing oscillations, considering torsion and vertical displacement.
- Paul Joss (U of C) Area: Pension Accounting--Building an asset-liability model to stochastically simulate how corporate earnings will be affected by forth coming changes to the Canadian pension cost accounting standards.
- Abdur Rab (U of A) Area: Neural Networks. Radial Basis function interpolation.
- Satoshi Tomoda (U of C) Area: Topology. Mapping and 'translations' of topological spaces into Algebraic Spaces.
- Qian Wang (U of A) Area: Differential Equations. Working on Compound Matrices and applications, Compound Differential Equations.
- Claudia Caia (U of A) Area: Applied Math. Working on Body Flow problems. Trying to simulate the development of 3-dimensional 2-phase flow solver.

The rest of students did not get a chance to present, but the interests of these were in the areas of Neural Networks, Algebra, Biostatistics, Perturbation Theory, Shape Analysis and Stochastics.

In general students were eager and interested in the possibility of this type of session being carried out again in next year's meeting. The idea of a bigger session where talks or posters could be presented was appealing to most.
Some students from different universities got to share ideas on each other's work, or exchange some bibliography that might be helpful to other students' work.