Problem List

July 2, 2008

1. Rumor propagation

   - Determine most influential rumor-monger
   - Find center of network without finding edges
   - Given a sequence of pairs, (p_i, c_i) in a network, what is the most likely "next" term (p_n, c_n)?

2. Logarithmic method for solving inverse problem

3. Find networks so that Λ^2 is tridiagonal

4. Directed network problems

   - Forward problem on asymmetric networks
   - Inverse problem on symmetric networks

5. Complete work on 3-to-1 graphs

6. Use plexers to find n-to-1 graphs

7. Given a response, when could it have come from a planar graph (find an efficient algorithm)

8. Suppose $|\lambda(P; Q)| = 0$ for some pair $(P; Q)$ and some network $\Gamma = (G, \gamma)$, but there is actually a $(P; Q)$-connection. Is there (simpler) network with the same response matrix for which this connection does not exist?

9. Find a "basis" for connnections (Chacon, 2005; Xu, 2004)

10. Is the concept of medial graph useful for graphs with genus larger than 1?

11. Probability, random walks, and electrical networks. See Diamondstone and Lewis, 2004; DeVries, 2003; Krenz, 1992

12. Discretize the ideas in the IPAM conference on Graph Cuts and Optimization (http://www.ipam.ucla.edu/programs/gc2008/)

13. Heat equation and random walks

14. Spectral graph theory (book by Fan Chung: "Spectral Graph Theory")

15. Hot spot conjecture and graph theory

16. Eigenfunctions and regions in graphs ala Courant-Hilbert, "Methods of Mathematical Physics". See Tittlefitz, 2006.

17. Networks over other fields (Completions of F_p, non-Archimidean fields, ...)

18. Automorphism groups of graphs

19. Harmonic maps (Giansiracusa, 2004)

20. Signed Conductivities (Schroder, 1993, Goff, 2003)

21. Indices for mathematics and how to use computers in proofs

22. Standardized language for mathematical statements

23. Contribute to databases (Sloane, etc)

24. Pattern avoidance questions

25. Bruhat orders

26. Kazdan-Lustig polynomials