Math 725 Final Project
Spring 2006

Project requirements

(1) Read a journal article on a topic in graph theory. You can choose the article from the attached list, find an article yourself, or ask me to recommend an article on your favorite topic. In any case, you must get my approval for the article you have chosen; two people cannot report on the same article. You must make your choice by **Monday, April 3.**
(2) Write a short report (approximately 3–4 pages) summarizing the results of your chosen article. The report must be written in good mathematical style. The final report is due on **Wednesday, May 10.**
(3) Give a short presentation (approximately 15–20 minutes) in class. The presentations will take place during the last week of class: **Friday, May 5** through **Wednesday, May 10**.

General instructions on content and style

Your paper should be in narrative style; in particular it should not be just a list of theorems or equations. (It is appropriate, however, to state the major results word-for-word.) It should make sense to someone who has been in our course, but has not read the article. It should give an overview of the article, emphasizing the general ideas and the relationships among the results in the article.

You should include at least one proof. This should not be copied word-for-word from the article. To accomplish this, study the proof until you understand it well. You will probably have to fill in details the author omitted. Then put the article away and write a proof of the result. You should also illustrate special definitions and results with your own examples (different from those in the article).

You should also include a bibliography. This will certainly include the article you are studying, probably a general reference work such as West's textbook, and possibly books or articles on related subjects.

You should follow the more detailed guidelines on proper mathematical style available from the course website.

You are *strongly* urged to prepare your report using LaTeX, which is far and away the most widely used system for typesetting mathematical documents—it is easy to use, freely available for all computing platforms, and quite powerful; a working knowledge of LaTeXis almost a must for a professional mathematician. For help getting started, ask a friend (or the instructor), or visit one of the zillion online help sites such as `www.tug.org`.

Suggested articles

Many of the articles I've chosen are from the Electronic Journal of Combinatorics (`www.combinatorics.org`), an open-access journal. Some others are available from the preprint server at `www.arXiv.org`. Papers from print journals are available in Anschutz Library (call numbers are given), or through interlibrary loan as a last resort.

(1) M.O. Albertson and J.P. Hutchinson, *Graph color extensions: when Hadwiger's Conjecture and embeddings help*, Electronic J. Combin. **9** (2002), no. 1, article #R37.
(2) L. W. Beinicke, *The decomposition of complete graphs into planar subgraphs*, Graph Theory and Theoretical Physics, Academic Press, New York, 1967, 139–154. QC 20 .G72
(3) L. W. Beinicke and J. W. Moon, *On bipartite tournaments and scores*, The Theory and Applications of Graphs, Wiley, New York, 1981, 55–71. QA 166 .I55 1980
(4) F. Bernhart, *A digest of the four color theorem*, J. Graph Theory **1** (1977), 207–225. QA 166 .J68

(5) S. A. Burr and P. Erdös, *Generalizations of a Ramsey-theoretic result of Chvátal*, J. Graph Theory **7** (1983), 39–51. QA 166 .J68
(6) P. Chebotarev and R. Agaev, *Forest matrices around the Laplacian matrix*, Linear Algebra Appl. **356** (2002), 253–274. QA 251 .L52
(7) D. Duffus, I. Gould and Jacobson, *Forbidden subgraphs and the Hamiltonian theme*, The Theory and Applications of Graphs, Wiley, New York, 1981, 297–316. QA 166 .I55 1980
(8) J. Edmonds and R. M. Karp, *Theoretic improvements in algorithmic efficiency for network flow problems*, J. ACM **19** (1972), 248–264. QA 76 .A77
(9) C.D. Godsil, I. Krasikov, and Y. Roditty, *Reconstructing graphs from their k-edge deleted subgraphs*, J. Combin. Theory Ser. B **43** (1987), no. 3, 360–363. QA 166 .J66
(10) J. L. Gross and S. R. Alpert, *The topological theory of current graphs*, J. Comb. Theory, Series B **17** (1974), 218–233. QA 166 .J66
(11) R. Häggkvist, R. J. Faudree and R. H. Schelp, *Pancyclic graphs—connected Ramsey number*, Ars Combinatoria **11** (1981), 37–49. QA 164 .A78
(12) W. Haken, *An attempt to understand the Four Color Problem*, J. Graph Theory **1** (1977), 193–206. QA 166 .J68
(13) S. L. Hakimi, *On the realizability of a set of integers as degrees of the vertices of a graph*, J. Society for Industrial and Applied Math. **10** (1962), 496–506. QA 1 .S73
(14) Wen-Lian Hsu, *Recognizing planar perfect graphs*, J. ACM **34** (1987), 255–288. QA 76 .A77
(15) Adam Idzik, Jan Komar and Marcin Malawski, *Edge-coloured complete graphs: Connectedness of some subgraphs*, Discrete Math. **66** (1987), 119–125. QA 150 .D5x
(16) A.K. Kelmans, *A new planarity condition for 3-connected graphs*, J. Graph Theory **5** (1981), 259–267. QA 166 .J68
(17) L. Lovász, *Normal hypergraphs and the perfect graph conjecture*, Discrete Math. **2** (1972), 253–267. QA 150 .D5x
(18) J.H. Mason, *On a class of matroids arising from paths in graphs*, Proc. London Math. Soc. (3) **25** (1972), 55–74. QA 1 .L5
(19) C. St. J. A. Nash-Williams, *Hamilton arcs and circuits*, Recent Trends in Graph Theory, Springer-Verlag, 1971, 197–210. QA 3 .L28 no. 186
(20) A. Nilli, *On the second eigenvalue of a graph*, Discrete Math. **91** (1991), 207–210. QA 150 .D5x
(21) E. A. Nordhaus, B. M. Stewart and A. T. White, *On the maximum genus of a graph*, J. Comb. Theory, Series B **11** (1971), 258–267. QA 166 .J66
(22) K. R. Parthasarathy and G. Ravindra, *The strong perfect graph conjecture is true for $K_{1,3}$-free graphs*, J. Comb. Theory, Series B **22** (1976), 212–223. QA 166 .J66
(23) Gerard Sierksma and han Hoogeveen, *Seven criteria for integer sequences to be graphic*, J. Graph Theory **15** (1991), 223–231. QA 166 .J68
(24) R. P. Stanley, *Acyclic orientations of graphs*, Discrete Math. **5** (1973), 171–178. QA 150 .D5x
(25) M. Thistlethwaite, *A spanning tree expansion of the Jones polynomial*, Topology **26** (1987), no. 3, 297–309. QA 611 .A1 T669
(26) C. Thomassen, *Some homeomorphism properties of graphs*, Math. Nachr. **64** (1974), 119–133. QA 1 .B15
(27) A. Tucker, *The strong perfect graph conjecture for planar graphs*, Canad. J. Math. **25** (1973), 103–114. QA 1 .C36
(28) J. Tymoczko, *Distinguishing numbers for graphs groups*, Electronic J. Combin. **11** (2004), no. 1, article #R63.
(29) R. M. Wilson, *Decompositions of complete graphs into subgraphs isomorphic to a given graph*, Proceedings of the Fifth British Combinatorial Conference (1975), 647–659. QA 164 .B74 1975
(30) D. R. Woodall, *Sufficient conditions for circuits in graphs*, Proc. London Math. Soc. **24** (1972), 739–755. QA 1 .L5
(31) R. Xu and C.-Q. Zhang, *Nowhere-zero 3-flows in squares of graphs*, Electronic J. Combin. **10** (2003), no. 1, article #R5.
(32) Fu-ji Zhang and Xiao-Fong Guo, *Hamilton cycles in Euler tour graphs*, J. Comb. Theory, Series B **40** (1986), 1–8. QA 166 .J66