Graph Labelings

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Extremal Problems and Hamiltonicity in Graphs
ITB Bandung, 2-13 February 2009

Outline of this session

What is this course about

Graph Labeling

Assigning elements of a group to vertices/edges by fulfilling arithmetic requirements.

1. Vertex labelings
2. Edge labelings
3. Total labelings

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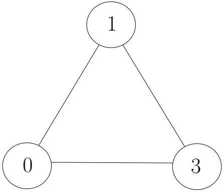

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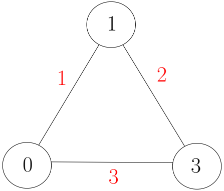

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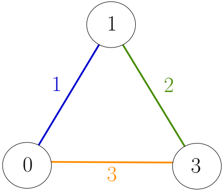

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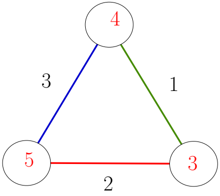

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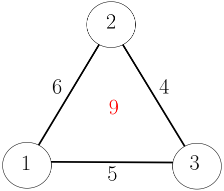

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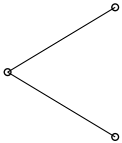
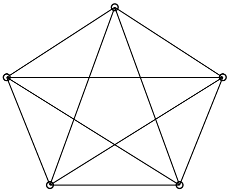
Some motivations

Conjecture (Ringel, 1966)

The complete graph K_{2n+1} can be decomposed into $2n+1$ isomorphic copies of any given tree of size n.





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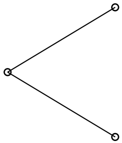

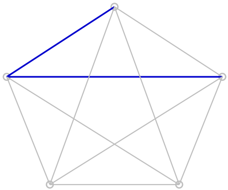

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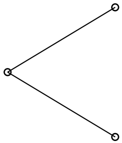

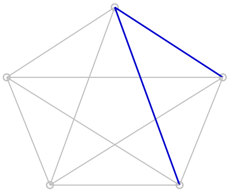

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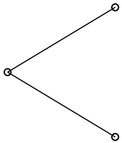

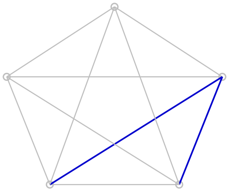

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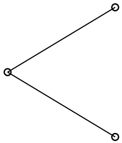

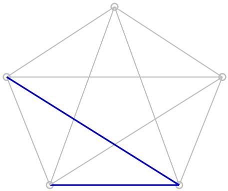

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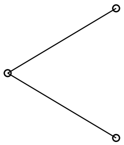

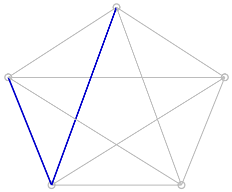

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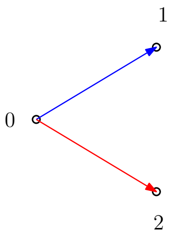

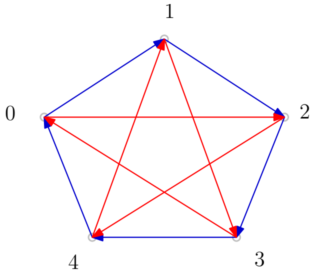

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Every tree with n edges decomposes any bipartite n–regular graph.

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Applications

Coding theory, X-ray cristalography, radar, circuit design, communication network broadcasting and addressing, database management...

Workplan

Session 1 Graceful labelings: elementary techniques, examples and general results.

Session 2 Modular Labelings: ρ-labelings, harmonious, bigraceful.

Session 3 An application to coding theory: Array codes of graphs.

Session 4 Magic Graphs: Some examples of the probabilistic method.

Session 5 Applications of the polynomial method to graph labeling problems.

References

A Dynamic Survey of Graph Labeling

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Duluth, Minnesota 55812
jgallian@d.umn.edu

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Eleventh edition, February 29, 2008
Mathematics Subject Classifications: 05C78

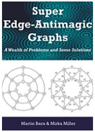
Abstract

A graph labeling is an assignment of integers to the vertices or edges, or both, subject to certain conditions. Graph labelings were first introduced in the late 1960s. In the intervening years dozens of graph labelings techniques have been studied in over 800 papers. Finding out what has been done for any particular kind of labeling and keeping up with new discoveries is difficult because of the sheer number of papers and because many of the papers have appeared in journals that are not widely available. In this survey I have collected everything I could find on graph labeling. For the convenience of the reader the survey includes a detailed table of contents and index.

THE ELECTRONIC JOURNAL OF COMBINATORICS **15** (2008), #DS6

References

- M. Bača and M. Miller, Super Edge- AntiMagic Graphs: A weath of problems and Some Solutions, Brown Walker Press (2008)

  A very recent book by a top expert well–known to you.

- G.S. Bloom and S.W: Golomb, Applications of numbered graphs, *Proc. IEEE* **65** (1977) 562-570.

  Still a good reference for several applications of graph labeling in engineering and computer science.

- J. A. Gallian, A Dynamic survey on Graph Labeling, The Electronic Journal of Combinatorics, **15** (2008) # DS6.

  A thorough updated reference in the area.

- W. Wallis, Magic Graphs, Birkhauser (2005)

  A book to become classical by a good friend of Indonesian combinatorialis