

MAT 375
Main Topics for Test 1
Thursday, October 6, 2011

Definitions

Be able to write the precise mathematical definition of these terms:

path	complete graph	chromatic number
circuit	complement	directed tree
connected graph	planar graph	leaves
degree of a vertex	plane graph	internal vertices
tree	Euler cycle	m-ary tree
bipartite graph	Euler trail	height of a tree
independent set	Hamilton circuit	balanced tree
isomorphism	Hamilton path	spanning tree
subgraph	coloring	

Problem Solving

Be able to solve problems of these types:

- Find the minimum number of police required for street surveillance
- Job matching
- Test to see if two graphs are isomorphic
- Use the fact that the sum of the degrees of the vertices equals twice the number of edges, and its consequences
- Test whether a graph is bipartite
- Test whether a graph is planar
- Use Euler's Formula and its consequences
- Find an Euler cycle (or Euler trail) when one exists
- Prove nonexistence of a Hamilton circuit
- Determine the chromatic number of a graph
- Construct a graph model (interpretation of vertices, edges and, possibly, colors) for applications
- Use the Branch and Bound Method to find a Hamilton circuit of minimal cost.

Properties of Trees

Be able to solve problems of these types:

- Use the fact that a tree with n vertices has $n-1$ edges.
- Use these facts for m -ary trees: $n = mi + 1$ $n = l + i$ $l \leq m^h$
- Do depth-first and breadth-first searches.
- Test for connectedness by searching for a spanning tree.
- Make conclusions about a graph from its adjacency matrix.
- Do pre-order and post-order traversals.