

MthSc 814 Test #1 – Outline

Computational Complexity

- complexity of functions

 - big-Oh, big-Omega, big-Theta notation

- complexity of algorithms

 - worst-case, asymptotic behavior

 - big-Oh, big-Omega, big-Theta notation

 - (weakly) polynomial, strongly polynomial, pseudopolynomial

- complexity of problems

 - classes \mathcal{P} and \mathcal{NP} ; \mathcal{NP} -complete problems

Data Structures

- incidence, adjacency matrices

- adjacency lists, forward star representation

- trees, queues, stacks

Graph Searching

- directed and undirected graphs

- breadth-first, depth-first search

- topological order (acyclic graphs)

Shortest Paths

- examples, formulations

- optimality conditions

- single-source problem

 - shortest path tree (root r)

- acyclic networks: pulling, reaching algorithms

- nonnegative arc lengths (Dijkstra's algorithm)

 - four implementations (array, bucket, Dial, d -heap)

- algorithm correctness

- complexity analyses

Label-Correcting Algorithms

- optimality conditions

- generic label-correcting algorithm (Ford's algorithm)

- modified label-correcting algorithm

- algorithm complexity

- negative length cycles