

Chapter 4. Trees

Study Guide

The following is a brief list of topics covered in Chapter 4 of Bondy and Murty's *Graph Theory*, Graduate Texts in Mathematics 244 (Springer, 2008). This list is not meant to be comprehensive, but only gives a list of several important topics. You should also carefully study the proofs given in class and the homework problems.

Section 4.1. Forests and Trees.

Tree, forest, path connectedness of trees (Proposition 4.1), leaf, relationship between the number of edges and vertices in a tree (Theorem 4.3), rooted tree, branching, reachable vertices, median order of a digraph and properties (Theorem 4.1.A), alternative proof of Rédei's Theorem (Corollary 4.1.B), presence of branchings in tournament (Theorem 4.5).

Section 4.2. Spanning Trees.

Subtree, spanning tree, classification of connected graphs in terms of spanning tree (Proposition 4.6), classification of bipartite graphs in terms of odd cycles (Theorem 4.7), Cayley's Formula (Theorem 4.8), the number of spanning trees $t(G)$, the number of spanning trees of G in terms of the numbers of spanning trees in $E \setminus e$ and G/e (Theorem 4.9).

Section 4.3. Fundamental Cycles and Bonds.

Cotree of a connected graph, fundamental cycle, symmetric difference of fundamental cycles as an even subgraph (Theorem 4.10 and Corollary 4.11), cotrees and even subgraphs (Corollary 4.12), fundamental bond, symmetric difference of fundamental bonds as edge cuts (Theorem 4.13 and Corollary 4.14), spanning trees and edge cuts (Corollary 4.15), cyclomatic number.

Section 4.4. Related Reading.

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