Chapter 3. Quasigroup Identities and Graph Decompositions

Study Guide

The following is a brief list of topics covered in Chapter 3 of Lindner and Rodger's *Design Theory* Second Edition, Discrete Mathematics and Its Applications Series, CRC Press (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 3.1. Quasigroup Identities.
Orthogonal array, using a quasigroup to create an orthogonal array (Note 3.1.A), using an orthogonal array to create a quasigroup (Lemma 3.1.A), examples of quasigroups and corresponding orthogonal arrays (Example 3.1.1), the symmetry group S_3 on the symbols $1, 2, 3$, applying a permutation $\alpha \in S_3$ to an orthogonal array, if R is an orthogonal array the $R\alpha$ is an orthogonal array for $\alpha \in S_3$ (Lemma 3.1.B), conjugate orthogonal arrays, conjugate quasigroups, equal orthogonal arrays, invariant orthogonal quasigroup under conjugation by a permutation (Note 3.1.C), the conjugate invariant subgroup of a quasigroup, totally symmetric quasigroup, semisymmetric quasigroup, identities that determine quasigroup symmetry (Note 3.1.D).

Section 3.2. Mendelsohn Triple Systems Revisited.
Idempotent quasigroup, the construction of an idempotent semisymmetric quasigroup of order n from a Mendelsohn triple system of order n (Note 3.2.A), the construction of Mendelsohn triple system of order n from an idempotent semisymmetric quasigroup of order n (Note 3.2.B), Mendelsohn quasigroup.

Section 3.3. Steiner Triple Systems Revisited.
The construction of an idempotent totally symmetric quasigroup of order n from a Steiner triple system of order n (Note 3.3.A), the construction of Steiner triple system of order n from an idempotent totally symmetric quasigroup of order n (Note 3.3.B), Steiner quasigroup, identities that determine a Steiner quasigroup (Note 3.3.C).

Revised: 8/16/2022