Chapter 7. Affine and Projective Planes
Study Guide

The following is a brief list of topics covered in Chapter 7 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 7.1. Affine Planes.

Lines, collinear points, parallel lines, affine plane, Parallel Postulate, properties of an affine plane (Exercise 7.1.3), the order of an affine plane.

Section 7.2. Projective Packings.

Projective plane, degenerate projective plane, properties of a projective plane (Exercise 7.2.2), order of a projective plane.

Section 7.3. Connections between Affine and Projective Planes.

Parallel class in an affine plane, creation of a projective plane of order n from an affine plane of order n (Exercise 7.3.3), adding a line at infinity, creation of an affine plane of order n from a projective plane of order n (Exercise 7.3.5).

Section 7.4. Connections between Affine Planes and Complete sets of MOLS.

The creation of an affine plane of order n from a complete set of MOLS(n) (Note 7.4.A and Exercise 7.4.6) and its application (Example 7.4.1), creation of a complete set of MOLS(n) from an an affine plane or order n (Note 7.4.B and Exercise 7.4.7) and its application (Example 7.4.2), an affine plane of order n is equivalent to a complete set of MOLS(n) (Theorem 7.4.3), Bruck and Ryser's conditions for the nonexistence of an affine plane (Theorem 7.4.4), the computer search for an affine plane of order 10.

Section 7.5. Coordinatizing the Affine Plane.

The use of parallel classes in an affine plane to introduce coordinates (i, j), x-axis, y-axis, the line of slopes, origin, slope of a line, point slope formula, Exercise 7.5.1.