Preparation sheet for the Final Test

Problems on this Test will be based on the homework problems and lecture notes listed below. Note that a problem on the Test may combine concepts of more than one problems listed on this sheet, or it may use only part of the solution of a given homework problem.

When preparing for the Test, it will be beneficial for your performance if you actually redo the problems listed below. At the very least (i.e. if you cannot do the problem on your own), you should go over my solutions and make sure that you understand and can repeat each step. Please note: It will not help you much if you simply browse those problems without actually doing them.

When reviewing the lecture notes listed below (or the book) and redoing the problems, make sure that you understand how what you are reading or doing is related to the corresponding topic listed in conjunction with those notes.

The standard disclaimer applies:
This list of problems is not meant to be exhaustive. Rather, it is meant only to help you pay special attention to specific concepts. As for any test, you are expected to know all concepts that have been covered in the course, unless it is noted otherwise below.

Note 1:
You may prepare and use three double-sided sheets with formulae.

Note 2:
The notation for homework problems on this preparation sheet is as follows: E.g., Problem 5 from HW 8 will be denoted as Problem 8.5, etc.

1. Basic properties of modulus and complex conjugation for arbitrary complex numbers and for $e^{i\theta}$ in particular. Polar form of complex numbers.
   Related HW Problems: 1.1, 3.4(i), 3.5(i), 3.10.
   Related lecture notes: 1.3, 5.1, 7.

2. Argument of a complex number, and basic operations with it. Geometric interpretation of multiplication and division of complex numbers.
   Related HW Problems: 2.5, 2.6(i), 3.6, 3.7, 3.8.
   Related lecture notes: 5.2, 5.3, 9.1.

3. Properties of the $n$th complex root of 1, and of $\omega$ in particular.
   Related HW Problems: 3.1(iii), 3.8 (yes, again).
4. Basic facts from elementary geometry. Make sure you know all the four criteria of congruence of triangles.
   Related HW Problems: 4.1, 4.2, 7.1(i).
   Related lecture notes: 8.1.

5. Basic fact [F13] and its converse.
   Related HW Problems: 4.4, 5.6.
   Related sections from notes: 8.1, 10.1, 10.3 (pay attention to the details of the derivation of the main result).

6. Derivation of the equation of a line passing through two given points.
   Related lecture notes: 12.1.

7. The statements (with understanding) of the Nine-point circle and Morley theorems.
   Related lecture notes: 11, 12.3.

8. Definition of inversion. The fundamental theorem of Möbius geometry.
   Related HW Problems: 9.1(ii), 9.3.
   Related lecture notes: 15.1, 15.2.

   Related HW Problems: 10.2.
   Related lecture notes: 16.2, 16.3.

10. The invariants of Möbius transformations. The standard position of a point and a line in the disk model of hyperbolic geometry.
    Related HW Problems: 10.7(i), 11.1(i), 11.4(i), 12.2(i).
    Related lecture notes: 15.3, 17.2.

11. Two families of Steiner circles. Their importance in the disk model of hyperbolic geometry.
    Related HW Problems: 10.4, 10.5.
    Related lecture notes: 16, 18, 19.4.

12. The standard position of a hyperbolic straight line in the disk model. Parallel and hyperparallel hyperbolic straight lines. Curves perpendicular to hyperbolic straight lines, horocycles, and hypercycles.
    Related HW Problems: 10.6(i), 10.7, 11.3.
    Related sections from notes: 17.3, 18, 19.4.

13. Hyperbolic straight lines and cycles in the UHP model of hyperbolic geometry. The generic and standard positions of all four types of these lines/curves.
    Related HW Problems: 12.3(ii).
    Related lecture notes: 20, 21.2 (only the part that is related to the above concepts).

14. Areas of triangles and quadrilaterals in hyperbolic geometry.
    Related HW Problems: 10.6.