

## MATH 471

### List of questions for the Final

You need to understand all theorems, axioms and definitions that we discussed in our course. For the theorems listed below you must also know the proofs. You also could be asked to write the definitions below.

1. Axioms of the Euclidian geometry.(See axioms in notes).
2. The definitions of isometry(See page 4 in notes) and congruent sets. Properties of the congruent sets(See page 8 in notes).
3. When two segments are congruent? (See page 7 in notes)
4. Definition of a circle(See page 9 in notes). When two circles are congruent? (We did not discuss that, but you must be able to do it on your own).
5. Theorem 11( SSS)(See page 9 in notes).
6. Theorem 13 (Pons Asinorum) (See page 11 in notes) and the converse.
7. Theorem 18(See page 20 in notes).
8. Theorem 19(See page 21 in notes).
9. Theorem 20(See page 26 in notes).
10. Problem 10(See page 27 in notes).
11. Theorem 23(HL) (See page 29 in notes).
12. Quadrilaterals. (See page 32 and 35 in notes).
13. Trapezoid. Theorem 23 and 24 with the proof (See page 33 in notes, give the proof yourself).
14. Parallelogram. Theorem 25 (See page 34 in notes,give the proof yourself).
15. Rhombus,Theorem 26, (See page 36 in notes,give the proof yourself)
16. Rectangle,Theorem 27, (See page 37 in notes,give the proof yourself)
17. Square,Theorem 28, (See page 36 in notes,give the proof yourself).
18. Star Track Lemma (all cases) (See page 38 for one of the cases).
19. Theorem 32 (See page 40).
20. Thales Theorem (See page 43).
21. Theorem 35 (Midpoints theorem) (See page 45).
22. Theorem 39 (angle bisector theorem) (See page 49).
23. Definitions of dilations and central dilations. Theorem 41 (See page 50). Preserving of angles Theorem 43 (See page 51).
24. SSS,SAS,AA for similar triangles. Theorems 46,47,48. (See pages 53,54).

25. Pythagorean theorem. Theorem 50 (See page 56).
26. Prove that midperpendiculars intersect at one point. Prove that angle bisectors intersect at one point.
27. Prove that medians intersect at one point.
28. Power of the point, both cases with the proof. (See page 57,58)
29. Converse of Pythagorean Theorem(See page 59)
30. Ceva's Theorem and Converse of Ceva's Theorem(See page 60,61)
31. Menelaus' Theorem and Converse of Menelaus' Theorem(See page 62,63)
32. Trigonometric functions and simple formulas related to them: the main identity in trigonometry,  $\sin(180^\circ - \alpha) = \sin \alpha$ ,  $\cos(180^\circ - \alpha) = -\cos \alpha$  (See page 65,66)
33. Cosine Theorem(See page 67)
34. Sine Theorem(Law of Sin)(See page 68)
35. Parallelogram identity (problem 40). The length of a median (problem 41)(See page 69)
36. Definition of area(See page 70)
37. Area of a square(See page 70)
38. Area of a rectangle, without a proof(See page 71)
39. Area of a parallelogram(See page 72)
40. Area of a triangle, three formulas,  $\frac{1}{2}hb$ ,  $\frac{1}{2}ab \sin \angle C$  and Heron's formula(See page 73,75)
41. Area of a trapezoid(See page 74)
42. Area of a quadrilateral(See page 74)
43. Radius of inscribed and circumscribed circles Theorem 69 and 68(See page 76)
44. Problem 55,  $\sin 2\alpha = 2 \sin \alpha \cos \alpha$  (See page 77)
45. Proof that the sum of the angles of any triangle is  $\leq 180^\circ$  (see book ).
46. Proof that if there is a rectangle  $ABCD$ , then there is only one line through the point  $B$  which is parallel to the line  $AD$ .
47. Half-plane model of hyperbolic geometry: how lines look, how circle look, what segments are bigger (See pages 78,79,80,81)
48. Problems from the homework, problems 1-55.