MATH 532, 736I: REVIEW INFORMATION FOR TEST 1

What to Memorize:

- Know the axioms for a finite projective plane of order n:

  Axiom P1. There exist at least 4 distinct points no 3 of which are collinear.

  Axiom P2. There exists at least 1 line with exactly $n+1$ points on it.

  Axiom P3. Given any 2 distinct points, there exists exactly one line passing through the 2 points.

  Axiom P4. Given any two distinct lines, there exists at least one point where the lines intersect.

- Know the axioms for an affine plane of order n:

  Axiom A1. There exist at least 4 distinct points no 3 of which are collinear.

  Axiom A2. There exists at least 1 line with exactly n points on it.

  Axiom A3. Given any 2 distinct points, there exists exactly one line passing through the 2 points.

  Axiom A4. Given any line ℓ and any point P not on ℓ, there is exactly 1 line through P that does not intersect ℓ.

- Be able to prove that in a finite projective plane of order n, there exist exactly n^2+n+1 points and exactly n^2+n+1 lines. (In class, we used some results already established about projective planes. These results would be stated on the test.)

- Be able to prove that in an affine plane of order n, if ℓ is a line with exactly n points on it and A is a point not on ℓ, then there are exactly $n+1$ lines passing through A.

- Be able to prove that in an affine plane of order n, for each line ℓ, there are exactly $n-1$ lines parallel to ℓ.

- Be able to prove that in an affine plane of order n, each point has exactly $n+1$ lines passing through it. (The lemmas done in class will be given to you.)

What to Also Know:

- Know how to show that an axiomatic system is consistent, independent, and/or complete.

- Know how to make dual statements and know the principle of duality.

- Know how to construct finite projective planes and finite affine planes of order p.

- Know how to make incidence tables.

What NOT to Know:

- Geometric constructions with straight edge and compass

- Examples illustrating modulo arithmetic (other than construction of projective and affine planes)