Math 370: Abstract Algebra. Syllabus and Homework Schedule.

Dr. Aaron Silberstein

Syllabus: There will be one in-class midterm on October 29, and a second in-class midterm the last day of class. Problem sets will be given out weekly (≤ 10 problems per week, with the exception of the homework assigned due November 15), and will be due the date indicated, at 1 pm, to Dmytro Yeroshkin's mailbox. The syllabus is subject to change, as the course progresses.

- **Weeks 1-2**

  - Thursday August 29. Day 1: Sets (Herstein Sec. 1.1). Homework (due Friday, September 20): Herstein, Section 1.1, Problems 1, 9, 12 (you will need Day 3's lecture to do this problem). Section 1.2, Problems 1, 7, 10, 13. Section 1.3, Problems 3, 6, 17 (we give one proof of this in class).

  - Tuesday, September 3. Day 2: Functions (Herstein Sec. 1.2).

  - Thursday, September 5, Tuesday, September 10, Thursday, September 12. Days 3-5: The integers and induction (Herstein Sec. 1.3).

- **Week 3**

  - Tuesday September 17. Day 6: Sec. 2.1, 2.2, 2.3: Definition and Examples of Groups. Homework (due Friday, September 27): Herstein, Section 2.3, Problems 1, 4, 7, 11, 12. Section 2.5, Problems 1, 3, 21, 38, 41.

  - Thursday September 19. Day 7: Sec. 2.4, 2.5: Subgroups and a Counting Principle.

- **Week 4**

  - Tuesday September 24. Day 8: Sec. 2.6: Normal Subgroups and Quotient Groups. Homework (Due Monday, October 15): Herstein, Section 2.6, Problems 1-6 (These count together as three problems in my numbering scheme — they are relatively straightforward!), 9, 12, 21. Section 2.7, Problems 5, 8, 10, 11.

  - Thursday September 26. Day 9: Sec. 2.7: Homomorphisms and Sylow's Theorem.

- **Week 5**

  - Tuesday, October 1, Thursday, October 3. Days 10-11. Problem session! Cyclic groups. Homework (Due Friday, October 18): Herstein, Section 2.8, Problems 1, 2, 7, 14, 16, 21. Section 2.9, Problems 5, 6, 7, 10.

- **Week 6**

  - Tuesday, October 8. Day 12: Sec. 2.8: Automorphisms.
  - Thursday, October 10 - Fall Break.

- **Week 7**

  - Tuesday, October 15. Day 13: An example, and some synthesis: S_3 as permutations of the triangle.
  - Thursday, October 17. Day 14: Sec. 2.9, 2.10: Cayley's Theorem, Permutation Groups.

- **Week 8**

  - Tuesday October 22. Day 15: Sec. 2.10: Permutation Groups. Homework (Due Friday, November 15: two and a half problem sets = 25 problems.): Herstein, Section 2.10: Problems 1, 2, 3, 4, 11, 16, 21, 22. Section 2.11: Problems 1, 2, 5, 7, 9, 10. Section 2.12: Problems 1, 9, 11, 24. Section 2.13: Problems 2, 7, 8, 13. Section 2.14: Problems 4, 6-12 (most of these are one-line proofs).
  - Thursday October 24. Day 16: Sec. 2.11, 2.12: Another Counting Principle, Sylow's Theorem

- **Week 9.**

  - Monday, October 28. 7 pm: MIDTERM REVIEW SESSION/Dmytro's Recitation. Room: TBA.
  - Tuesday, October 29. Day 17. MIDTERM EXAM. Homework Breather.
  - Tuesday, October 31. Day 18. "Spooky" Sylow's Theorem, continued.

- **Week 10.**

  - Tuesday, November 5. Day 19. Sec. 2.13: Direct Products.
  - Thursday, November 7. Day 20. Sec. 2.14: Finite Abelian Groups.

- **Week 11.**

- Tuesday, November 12. Day 21: Sec. 4.1, 4.2: Elementary Basic Concepts of Vector Spaces and Modules, Linear Independence, Bases. Homework (Due Friday, November 22): Section 4.1, Problems 4, 5, 6, 7, 8, 13, 17. Section 4.2, Problems 5, 6, 7, 8, 16, 17. Section 4.3, Problem 7, 9.

- Thursday, November 14. Day 22: Sec. 4.3: Dual spaces.

- **Week 12.**

  - Tuesday, November 19. Day 23: Sec. 4.4: Inner Product Spaces. Homework (Due Monday, December 2): Section 4.4: Problems 1, 2, 3, 4, 8, 10. Section 4.5: Problems 4, 6, 9, 14.

  - Thursday, November 21. Day 24: Sec. 4.5: Modules.

- **Weeks 13-14.**

  - Tuesday, November 26. Day 25: Section 6.1, 6.3: The Algebra of Linear Transformations, Matrices. Homework (Due Friday, December 7): Section 6.1, Problems 2, 7, 14. Section 6.6, Problems 12, 14-20.

  - Tuesday, December 3. Day 26: Sec. 6.5, 6.6: The Jordan Canonical Form. Nilpotent Transformations.

  - Thursday, December 5. Day 27: Loose ends.

- **Week 15.**

  - Monday, December 9. MIDTERM REVIEW/Dmytro's Office Hours. Time: 7 pm. Room: TBA.

  - Tuesday, December 10. Day 28. MIDTERM EXAM.