

## MATH 123 - ALGEBRA II INFORMATION ON THE MIDTERM

**When?** The midterm will take place on Wednesday, March 11, 2020, from 9am to 10h15pm in room Sever-214 (the usual class time and place). If you cannot take the exam at that time (for example because of a religious holiday or a university event), please let me know as soon as possible ([sebv@math.harvard.edu](mailto:sebv@math.harvard.edu)).

**What is covered?** The midterm will cover everything discussed in class until and including Friday, March 6, as well as the material introduced in assignments 1-5. For your convenience, the following lists the topics discussed, with corresponding chapters and sections in Dummit and Foote.

- Basic ring theory: sections 7.1-7.6 (except material related to integer rings and fields, matrix rings, and group rings).
- Basic theory of factorization in integral domains: chapter 8 (except computational results on integer rings, and the application to factorization in the Gaussian integers).
- Polynomial rings and irreducibility: sections 9.1-9.4 (but we did not discuss polynomials in several variables).
- Basic module theory: sections 10.1-10.3 (but we did not discuss  $R$ -algebras).
- The structure theorem for modules over PIDs: sections 12.1-12.3 (we did not discuss how to compute the matrix canonical forms).
- Basic theory of fields and algebraic extensions: sections 13.1-13.2. (we did not discuss anything after theorem 17) [*This will not be tested very intensely, since there will be no time for you to get feedback on your assignments for this topic.*]

**What can I use during the exam?** You may only use your brain, an eraser, and a pen. Scratch paper will be provided if needed. You may *not* use any other documents: textbooks or personal notes are *not* allowed. You also may *not* use a calculator (you will not need one anyway).

**What will the exam look like?** The exam will have five problems and one extra credit question. The first problem will ask you to state (without proofs) results or definitions seen in class. The second problem

---

*Date:* March 6, 2020.

will be a true/false. The third problem will ask you to give the proof of a result seen in class. These first three problems will be in the same style as the practice problems in the assignments. Finally, the fourth, fifth, and extra credit problems will be statements that you have (probably) not seen before. I will try to make these problems slightly easier than in your homework, but your answer will be expected to have the same level of details as in the homework.

**What can I do to prepare for the exam?** Make sure you understand all of the homework and the course material. A sample exam is available on the course website. I highly encourage you to try to solve it!

**Will there be an assignment due right before the exam?** No. There will be a short assignment due Friday, March 13, but meant also to help you review for the exam.