

Exam 1

Your Name:

Names of Any Collaborators:

Instructions

Answer each of the following questions by **11:59pm on Tuesday, October 5**. If you cannot submit a physical copy of the exam, email me a PDF to confirm that you finished your exam on time and then give me a physical copy the next time you see me. This exam is worth a total of 29 points and is worth 20% of your overall grade.

I expect your solutions to be *well-written, neat, and organized*. Do not turn in rough drafts. What you turn in should be the “polished” version of potentially several drafts. Feel free to type up your final version. The L^AT_EX source file of this exam is also available if you are interested in typing up your solutions using L^AT_EX. I’ll gladly help you do this if you’d like.

Reviewing material from previous courses and looking up definitions and theorems you may have forgotten is fair game. However, when it comes to completing the following problems, you should *not* look to resources outside the context of this course for help. That is, you should not be consulting the web, other texts, other faculty, or students outside of our course in an attempt to find solutions to the problems you are assigned. This includes Chegg and Course Hero. On the other hand, you may use each other, the textbook, me, and your own intuition. Further information:

1. You may freely use any theorems that we have discussed in class, but you should make it clear where you are using a previous result and which result you are using. For example, if a sentence in your proof follows from Problem X.Y, then you should say so.
2. Unless you prove them, you cannot use any results from the course notes that we have not yet covered.
3. You are **NOT** allowed to consult external sources when working on the exam. This includes people outside of the class, other textbooks, and online resources.
4. You are **NOT** allowed to copy someone else’s work.
5. You are **NOT** allowed to let someone else copy your work.
6. You are allowed to discuss the problems with each other and critique each other’s work.

I will vigorously pursue anyone suspected of breaking these rules.

You should **turn in this cover page** and all of the work that you have decided to submit. **Please write your solutions and proofs on your own paper.** To convince me that you have read and understand the instructions, sign in the box below.

Signature:

Good luck and have fun!

For the following problems you will need to digest new content in our problem sequence. We will spend time discussing some of these concepts in class during the time you have available to work on the exam. However, you should not wait until I have discussed the relevant topics. Just dig in and get started.

For each problem you may only use results from the book that come before the corresponding problem.

1. Complete **all** of the following.
 - (a) (3 points) Problem 1.123
 - (b) (2 points) Problem 1.124
 - (c) (2 points) Problem 1.125. *Note:* This problem is similar to Problem 1.42, but you cannot simply cite that problem.
 - (d) (2 points) Problem 1.126
2. (4 points each) Complete **two** of the following.
 - (a) Problem 1.134. *Note:* This problem together with our definition of order of an element immediately implies Problem 1.135, which provides a useful characterization of order of an element.
 - (b) Problem 1.139. *Note:* Since $g^0 = e$, Problem 1.139 immediately implies Problem 1.140.
 - (c) Problem 1.143
 - (d) Problem 1.144
3. (4 points) Prove Problem 1.141.
4. (4 points each) Complete **two** of the following.
 - (a) Problem 2.19
 - (b) Problem 2.23(a)
 - (c) Problem 2.23(b)
 - (d) Problem 2.24
 - (e) Problem 2.31