

**Midterm Exam**

For students, both in-person and remote.

Your responses to Part I are due by email, in PDF format, to Scott by 8 AM on Wednesday, September 30. Your responses to Part II are due in either physical copy or in PDF format by 10 AM on Wednesday, unless you have made special arrangement. You should not share your responses to Part I with any student in the course prior to 9 AM Wednesday morning. You may use the textbook, notes, course videos, other online material as long as you cite every source you rely on, apart from your own notes from class, the course textbook and course videos. You are also required to give credit to anyone (other than Scott) you talk with about the exam, even if they didn't explicitly give you any ideas. Failure to cite your sources may result in a report of academic dishonesty. During the time period of the exam, you are not allowed to post questions pertaining to the course to online question-answering forums such as math.stackexchange, chegg, coursehero, etc. You are encouraged to not use any sources other than course notes, handouts, and the textbook. Your time is better spent thinking and writing, than searching.

Your responses to Parts I and II, though not your grades, will be shared with your classmates. **Your exam will not be graded if you do not either sign below prior to starting the exam or send me an email affirming the statement in the box.**

I acknowledge I have read the rules and that I agree to abide by them.

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Signature

## 1. PART I

Answer the following on separate paper/PDFs.

- (1) State **one** original investigative question pertaining to course material so far. “Original” means that it is not a question you found on the internet, or a question you specifically remember your classmate asking, or a problem from a knot theory textbook. You may, if you like, use or modify one of your own investigative questions from earlier in the course. An “investigative” question is a question that, so far as you can tell, does not have an obvious answer, is creative, can be taken in multiple directions, and you could imagine potentially turning into a summer-long research project.
- (2) Pick one of your investigative questions and expand it into **two** “digging deeper” style questions: Ask about particular cases you think might be tractable or simplify or narrow the problem in some way. You could, for instance, pick a particular kind of knot diagram and ask about your investigative question in the context of that knot diagram. Your questions should exhibit variation in style and focus.
- (3) Pick one or more of your digging deeper questions from (2) and work on it. Describe the different things you tried, emphasizing the role that course material plays. As you work, feel free to modify the question. Start with one question and if you get stuck early on then move to another. Working on 2 as opposed to just 1 does not necessarily benefit you, unless doing just 1 doesn’t give you enough opportunity to demonstrate mastery of aspects of course material.

## 2. PART II

You will be given (either physically or electronically) another student’s responses to Part I. Answer on separate sheets of paper/PDFs from both this exam and the other student’s exam. You may make annotations to the other student’s exam in order to refer to it in your own work. For instance, you may add a (\*) to the left of one of their paragraphs and then refer to (\*) in your own work.

- (1) Read your classmate’s responses to Part I.
- (2) **Suggest** one way they could continue to work on their problem(s) using the same course material that they are using, but which is different from the course material you used. (For instance, if they are using the bracket, your suggestion should also use the bracket.) You may, if you like, draw on additional course material beyond what they do, but you **must** use at least a significant amount of the material they do. Your suggestion should be fleshed out and specific. The goal is for your suggestions to help them make progress on their problem

## 3. GRADING RUBRICS

The grading of this exam will likely feel more like the grading of a paper than the traditional grading of mathematics exam. That’s okay! Not all mathematical knowledge can be captured or expressed in problem sets. Your exam grade will be a weighted average of the grades on Parts I (75%) and II (25%).

The grade on Part I will be a weighted average of grades of the following attributes. The grading will take into account the expectation that you have prepared for the exam prior to Monday (e.g. by going back over course material) and that you should not spend more than 4 hours working on Part I.

- (5%) Did you follow the directions?
- (25%) Effective use of Course Material. You do not necessarily need to use a lot of the material, but you should draw on at 2 different topics. Your use of these topics must be integral, and not tangential to your work. You must explicitly acknowledge the use of the material - don't make me guess whether you are trying to use something from the course.
- (25%) Creative use of Course Material. Is it clear that you are bringing your own ideas into it? Have you combined or related different course topics? Have you created something new?
- (25 %) Thoroughness of your Thoughts. Have you thought clearly about what you are saying? Do your answers reflect deep familiarity with course material? Have you pushed your ideas to the limits of what you could do based on what we've covered so far?
- (20 %) Communication. Have you clearly expressed your ideas in a way that is understandable to a classmate? Have you made effective use of diagrams? Did you give accurate citations as required?

The grade on Part II will be a weighted average of grades of the following attributes. These attributes are necessarily less stringent than those of Part I, since you have much less time to work on it.

- (5%) Did you follow the directions?
- (25%) Different use of Course Material. Did you make significant use of some aspect of course material that is different from your use in Part I? You must explicitly acknowledge the use of the material - don't make me guess whether you are trying to use something from the course.
- (25%) Helpfulness of Suggestions. Would your ideas be genuinely helpful to your classmate whose work you are commenting on? Is there "value-added" by your comments?
- (25 %) Thoroughness of your Thoughts. Have you thought clearly about what you are saying? Do your answers reflect deep familiarity with course material?
- (20 %) Communication. Have you clearly expressed your ideas in a way that is understandable to a classmate? Have you made effective use of diagrams? Is any commentary on your classmate's work provided in a constructive way?

## **Part I**

(5%) Did you follow the directions?

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(25 %) Thoroughness of your Thoughts. Have you thought clearly about what you are saying? Do your answers reflect deep familiarity with course material? Have you pushed your ideas to the limits of what you could do based on what we've covered so far?

(20 %) Communication. Have you clearly expressed your ideas in a way that is understandable to a classmate? Have you made effective use of diagrams? Did you give accurate citations as required?

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## **Part II**

(5%) Did you follow the directions?

(25%) Different use of Course Material. Did you make significant use of some aspect of course material that is different from your use in Part I? You must explicitly acknowledge the use of the material - don't make me guess whether you are trying to use something from the course.

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