

Name: _____

Due: Saturday, October 3, 11:59 pm via Gradescope

One of the best ways to succeed in this course is to think like a mathematician. Ask your own questions and make your own conjectures. What happens if a hypothesis is removed? Where exactly does the proof use each hypothesis? Could one step of the proof stand on its own as a lemma? What about the converse? What happens in the extreme cases? Can we generalize this? Does a pattern you noticed lead to a general statement? How does this connect to other results or math you know?

In order to promote this mindset, I am asking you to come up with your own problems. I will compile your statements into a list of practice problems for the midterm exam. Furthermore, some of the best ones (or variations of them) will appear on the midterm. As always, do not use outside resources, such as other textbooks or generative AI. A statement you found somewhere else defeats the purpose, since the point is to practice asking your own questions.

Directions. Create two statements that would make good “True or False” problems on Midterm Exam 1. One must be true and one must be false. Be sure to say what every variable is, for example “for all integers a and b .” A *good* statement targets a specific learning objective. It should be subtle enough that someone who does not understand the key idea is likely to get it wrong, but someone who does can answer it with confidence. Your two statements must come from two different topics: Chapter 1, Chapter 2, relations, or induction. Each statement should be provable or disprovable using only material from Chapters 1 and 2 and the supplements on relations and induction that we have discussed, and if it is true, its proof should not be too long. Statements taken directly from the book do not count, and unique statements are more likely to appear on the exam. For each statement, explain in one or two sentences why it is a *good* statement. Your work must be **turned in on this sheet**.

Statement 1 (True).

Proof.

Explain why your statement is a *good* statement.

Statement 2 (False).

Counterexample.

Explain why your statement is a *good* statement.