MATH 250: DAILY PREPARATION

Overview

Chapter 2 of our text focuses on some basics of logical reasoning and particularly the role that *conditional statements* and *quantifiers* play in mathematics. As mathematics is often interested in identifying patterns, it is no surprise that statements involving "if", "whenever", "for every", and "there exist" are common. Our main goal in Chapter 2 is to get comfortable with this underlying language of mathematics. We will devote formal time in class to these ideas both this Thursday and next Thursday, and many of these ideas will play a key role throughout the semester. Please be sure that you realize the importance of Chapter 2 and that the primary responsibility for reading, watching, and understanding lies with you.

Please setup an Overleaf account and **bring your laptop to class on Thursday 01/17**, we will do some troubleshooting and work through the TeX template together at the end of class.

Basic learning objectives

These are the tasks you should be able to perform with reasonable fluency **when you arrive at our next class meeting**. Important new vocabulary words are indicated *in italics*.

- Know what it means for basic "and", "or", "not", and conditional statements to be true, and know their truth tables.
- Understand that there are numerous ways to write a conditional statement in forms other than "if P, then Q."
- Understand what it means for two statement forms to be logically equivalent, plus understand how we test for such equivalence.
- Recognize a *biconditional* statement.

Advanced learning objectives

In addition to mastering the basic objectives, here are the tasks you should be able to perform in the near future **with practice and further study**:

- Have facility translating among different forms of an if-then statement with phrases like "only if", "necessary", "sufficient", "whenever", and more.
- Fully understand what is required for a conditional statement to be false.
- Understand the difference between the *converse* and *contrapositive* of a conditional statement and the different roles these statements play in exploring the truth of a conditional statement.
- Know key standard logical equivalencies, such as DeMorgan's Laws.
- Be able to negate any conditional statement, regardless of the form in which it is written.

Resources

Reading:

- In Section 2.1, read pages 33-34 (up through "some comments about the negation") and think briefly about the questions in Previews 1 and 2 (you need not write down your answers to these questions). Then read pages 36-40.

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- In Section 2.2, read pages 43-47 (up to "Another method of establishing . . ."). Think carefully about the ideas and questions in Preview 1. Preview 2 is included formally among the questions for which you need to provide written answers below.

Watching: Here are some additional resources that have been developed to support your learning:

- While not formally listed here, you should know that any of Screencasts 1.1.4, 1.1.5, 1.2.1, 1.2.1b, 1.2.2, 1.2.3, and 1.2.4 (all available through the Math 210 YouTube Channel) have good and helpful information in them to support key ideas in Sections 1.1 and 1.2 of our text. For instance, Screencast 1.2.4 discusses how to take a pre-proof analysis and convert it into a paragraph-style proof that follows key writing guidelines in the course. Any of these videos are worth your time, and you should use this resource if you find yourself seeking additional support beyond what we've discussed in class or you've encountered in reading.
- Screencast 2.1.1: http://gvsu.edu/s/qO (3:34)
- Screencast 2.1.7: http://gvsu.edu/s/qQ (6:44)
- Screencast 2.2.1: http://gvsu.edu/s/qR (8:03)
- Screencast 2.2.2: http://gvsu.edu/s/qS (7:00)

Questions

Respond to the following questions on separate paper, as explained in the document that describes guidelines and expectations for daily preparatory assignments. You should be prepared to show me your responses at the start of class; I will review your work briefly sometime before the end of class.

1. Complete Progress Check 2.1. Write each of your answers clearly as part of your response.
2. What is a biconditional statement? What is the truth table for a biconditional statement?
3. Consider the conditional statement "If n^2 is an even integer, then n is an even integer." What would it take to demonstrate that this conditional statement is false?
4. Complete Preview Activity 2 in Section 2.2. Write full responses to each of the three questions in the activity on the paper you will turn in.