

MATH 321: IN-CLASS WORKSHEET 3
FRIDAY, JANUARY 29TH

The subject of today's worksheet is about translating mathematical insights into words. Specifically, we will look at Chapter 6 of the textbook, about so-called proofs without words. The idea is, a clever picture or diagram succinctly communicates the core idea behind a proof. Often when writing mathematics, it can be difficult to turn the intuition behind a theorem into a written proof. Yet this is important, for at least two reasons. (1) It's not just about convincing yourself that XYZ is true, you also want to convince others; (2) Sometimes the intuition is incomplete or even incorrect, and this is made clear in the process of writing it up.

- (1) As a warmup, consider the diagrams in section 6.2 and 6.4. Take a moment to try to figure out what ideas are being communicated before you read the explanation.
- (2) Consider the diagrams in section 6.5, which purport to establish that four quantities are equal. Think about what the ideas communicated by the diagrams are, and try to translate that into words. Write a proof that two of the quantities—your choice of which two—are equal, based on the ideas communicated by the diagrams.
- (3) Look at the diagram in section 6.12, which purports to show that $31.5 = 32.5$. Explain what is wrong.
- (4) Time permitting, look at some of the other proofs without words in this chapter. Can you translate the ideas to written proofs?
- (5) On gradescope, submit your proof for (2) and your explanation for (3).