Math 351: Questions for discussion, 10 September 2018



* **Exercises** *(continued from last meeting)*
1. Define *absolute value*. State and prove the multiplicative property and the triangle inequality. State and prove, using induction, the extended triangle inequality. Show that the inequality |a – b| ≥ |a| – |b| (called the *difference form* of the triangle inequality) follows directly from the triangle inequality.
2. Let sn = c1 cos t + c2 cos 2t +…+ cn cos nt where . Prove that {sn} is bounded by 1.
3. Let Guess the limit, *L*, of the sequence {}. For which (positive) values of *n* is
4. Let Guess the limit, *L*, of the sequence {}. For which (positive) values of *n* is
5. Let {bn} be a sequence. Give the definition of: {bn} **converges**.

Define: {bn} **converges to L**.

1. Let Prove that {zn} converges to a limit L.
2. Let Prove that {en} converges to a limit *L*.
* More on Limits
1. Prove that if a sequence converges to *L*, then *L* is unique.
2. Prove that if {an} is a non-negative sequence converging to 0, the sequence must converge to 0 as well.
3. Define an = ∞.
4. Prove that the sequence an = 1+ n2 .
5. Which of the following sequences tend to ∞? For those that do, prove it.
6. (-1)2
7.
8. (-1)n n2
9.
10. 1+ n2
11. sin n + ln n
12. Prove that the sequence converges.
13. State the K- Principle.
14. Using the K- Principle prove that the sequence converges.
15. Using the K- Principle prove that the sequence converges.
16. Prove that
17. Prove that ln(ln n) .
18. Prove that .
19. Prove the theorem:

1. Prove that every convergent sequence is bounded.

*Everything should be made as simple as possible, but not simpler.*

– Albert Einstein, **Reader’s Digest** (Oct. 1977)