

Assignments Week 5 SF2705 Fourieranalysis.

These are the things that you are expected to do before the Lecture on the **4th of March**.

1 Reading: Read the entire chapter 4. We will probably continue with chapter 4 on the 11th as well.

2 Discussion questions.

1. In view of the proof of Theorem 1.3 on page 80 try to make sense of the following informal statement: “*The norm $\| \cdot \|$ does not make any real distinction between integrable and continuous functions. Everything we can do for continuous functions with the norm $\| \cdot \|$ we can do for integrable functions.*”.

This is an informal statement which is difficult to make sense of in general since we do not define what we mean by “*Do with $\| \cdot \|$.*”. It is just a rule of thumb. But when we construct complicated proofs it is important to be able to distinguish what is essential and not and if you have the norm $\| \cdot \|$ in a complicated proof it might be helpful - and probably not restrictive - to make the assumption that all functions are continuous.

2. Page 105 lists three “unanswered issues” in Hurwitz proof of the isoperimetric inequality. Try to think about these issues. Why are they issues? Can we really say to have proved the isoperimetric inequality without having defined “*the region enclosed by Γ* ”?

The proof (or is it a proof?) of the isoperimetric inequality is not very difficult. But hidden in the informal argument is a great lesson to be learned about the mathematical method - and this lesson is more important than the proof itself.

3. What is the most important step the proof of Lemma 2.2 on page 109? What makes the lemma true? I do not say that there is a “right” answer to this.)
4. Consider the first discussion question in relation to Corollary 2.3. Does the integral make any distinction between continuous and integrable function?

3 Problems to consider: Solve **16** and **20** in chapter 3. Also solve problem **1** on page 95.

4. Assignments for the 4th of March:

Assignment 1: Write down a complete solution to problems 12 and 19 (on page 91 and 94 in Stein-Shakarchi). Hand in your assignment on the lecture on the 4th of March.

5 Office hours: It does not seem to be any need for office hours. In case you have any pressing question please write me an email (johnan@kth.se) and we can book a time on Friday.