

## Lecture 1: Introduction to Fourier Analysis

- p.2, line 16: 'we now at a new' instead of 'we now look at an new'
- p.2, line -1: Maybe  $X \rightarrow \mathbb{C}^*$  instead of  $X \rightarrow \mathbb{C}$
- p.3, line 12: An 1 is missing in the denominator, i.e.  $\langle \chi_j, \chi_k \rangle = \frac{(\omega^{j-k})^n - 1}{\omega^{j-k} - 1}$
- p.3, last line: change the font on  $X$ , i.e.  $\chi : X \rightarrow \mathbb{T}$
- p.3, footnote: Maybe, normalize your scalarproduct (is more consistent with the rest of the script) and write the integral w.r.t. the measure  $\mu$ , i.e.  $\langle f, g \rangle = \frac{1}{|X|} \sum_{x \in X} f(x)g(x)$  and  $\langle f, g \rangle = \frac{1}{\mu(X)} \int_X f(x)g(x)d\mu(x)$
- p.5, Theorem 1.2: clarify "Let  $f : \mathbb{T} \mapsto \mathbb{C}$  b a continuous function ... for every  $t \in \mathbb{T}$  at which  $f$  is continuous"
- p.6, Proposition 1.5: correct the denominator, i.e.

$$\frac{1}{n+1} \left( \frac{\sin \frac{n+1}{2}s}{\sin \frac{s}{2}} \right)^2$$

## Lecture 2: Introduction to Some Convergence Theorems

- p.8, fejer kernel property 2: normalize  $\frac{1}{2\pi} \cdot \int_{\mathbb{T}} k_n dt = 1$
- p.9, normalized measure  $\mu$  ... state that  $\mu(G) = 1$  explicitly
- p.11, secondlastline of this proof should be  $\int_a^b |h(x)(P(x) - \overline{h(x)})| dx \leq c \cdot \varepsilon \cdot |b - a|$
- p.11, end of the proof of Theorem 2.4: You want to say that  $h \equiv 0$  in  $L^2[a, b]$  and not that  $h = 0$  pointwise. Right?
- p.11, Theorem 2.5: normalization factor and formulation, i.e.

$$\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{r=1}^n f(2\pi r \gamma) = \frac{1}{2\pi} \int_{\mathbb{T}} f(t) dt$$

Perhaps change also the domain of your function  $f$  appropriate.

- p.12, line 1: It is also used...
- p.12, line -3: 'continuous function  $f$  such that' instead of 'continuous function such that'

- p.13, Definition 2.3: Write for example

$$\ell_p = \left\{ (x_i)_{i \in \mathbb{N}} : \sum_{i \in \mathbb{N}} |x_i|^p < \infty \right\}$$

- p.13, line -3: third SUM should have a factor 2 in front and secondlast  $e_i$  should be  $e_j$

$$2 \sum \langle f, e_i \rangle \langle f - \sum_{j=1}^n \langle f, e_k \rangle e_j, e_i \rangle - 2 \sum_i \lambda_i \langle f - \sum_{j=1}^n \langle f, e_j \rangle e_j, e_i \rangle$$

- p.13, line -2: Replace 'innter' by 'inner'

### Lecture 3: Harmonic Analysis on the Cube and Parseval's Identity

- p.16, line 3 from the bottom: 'Weierstrass' instead of 'Weierstrauss'
- p.17, just before Theorem 3.3:  $f$  should be continuous as well
- p.17, Theorem 3.3: It is not clear where this theorem comes from. I think you stated here the theorem without a proof. Is this Dirichlet's Theorem?
- Section 3.3: The notation of the 2-Norm is not always the same. It would be clearer if there would always be  $\|\cdot\|_2$ .
- p.20, equation (3.4): maybe more space in between the formulas (around the comma)
- p.20, second line of proof of Theorem 3.11: write  $\langle f, f \rangle$  instead of  $\|f\|_2^2$  just as before and afterwards
- p.21, proof of Corollary 3.13 second line: it is not immediately clear from where the factor 2 comes, maybe still sum over  $1 \leq |r| \leq n$ , and change in next line
- p.22, line -5, 'C is a circle', new line for this

### Lecture 4: Applications of the Harmonic Analysis

- p.24: The way you write Parseval's Identity is a bit misleading. It is not clear at first view where the normalization factors are. Perhaps you can write these norms and scalarproducts out as sums.

- p.24, proof of Corollary 4.2: mention something about the scalar product (real-, complex-valued), because  $\langle f + g, f + g \rangle = \langle f, f \rangle + \langle f, g \rangle + \langle g, f \rangle + \langle g, g \rangle$  and in complex case  $\langle f, g \rangle$  might not be the same as  $\langle g, f \rangle$ .
- p.25, line 4, in the integral  $\int g(u)ds$  the term  $e^{-iru}$  is missing and integration should be w.r.t  $u$
- p.25f, Hurwitz proof: I get in most of the calculations the other sign as in the script, e.g. p.25, line -1, should be a '+n<sup>2</sup>' not '-n<sup>2</sup>'(...)
- p.26, equation (4.2): The second arguments in the scalar products in the first line should be conjugate and analog for the second line.
- p.28, MacWilliams identity: factor  $\frac{1}{2^n}$  is missing
- p.29, also factors  $\frac{1}{2^n}$  missing in last and thirdlastline of proof
- p.30, line 8, matrix dimensions are  $n \times k$  not  $k \times n$
- p.30, line 11, Variable cannot be zero i.e. write 'as for a given  $x \in \{0, 1\}^n, x \neq 0$ '
- p.30, secondlastline of proof:  $|Ax| < \delta$ , and in the last exponent there is something strange with the brackets, in the exponent there is still an  $o(n)$  not 1; however than why is  $Pr[.] \leq 2^{\text{'negative'+}o(n)} < 1$ ?
- p.30, line -1, sum over  $\binom{C}{2}$  rather than  $C \times C$
- p.31, middle, where  $z_i$  is the number of WORDS IN C WITH zeros in the...
- p.32, title of section 4.4: Change the name to 'Erdős'
- p.32, line -10, 'intersecting' instead of 'itersecting'

## Lecture 5: Isoperimetric Problems

- p.34, line 8: 'The edge problem ...  $|S| = k$ ' (instead of  $R$ ), 'how small CAN  $e(S, S')$  be?'
- p. 34: The definition of shadow is strange. I think you want the following

$$\sigma(f) = \left\{ y \in 2^{[n]} \mid \exists x \in f : x \supseteq y \right\}$$

- p.36, line 7: 'We need to know  $\hat{1}_{L_j}(T)$  if  $|T| = t$ .'
- p.36, line 8,9: The factor  $\frac{1}{2^n}$  should be on the right hand side.
- p.36, line 10: The left hand side should be  $K_j^{(n)}(t)$ .

- p.37, line 8: Write  $1_{L_p}$  instead of  $1_p$  and the same for  $q$ .
- p.37, line 9,10: In the Parsevals identity you have also a factor  $2^n$  which you should add somewhere to get a correct statement.
- p.37, Lemma 5.1: 'The Krawtchouk polynomials satisfies a 3-term recurrence' (the other statement is Theorem 5.2)

## Lecture 6: MRRW Bound and Isoperimetric Problems

- p.39, line 2: definition of  $f$ ; factor missing:  $f = 2^n \cdot \frac{g * g}{|C|}$
- p.39, line 1,2 from bottom: Add on the left hand side a factor  $2^n$ . In line 2 from the bottom the summation should go up to  $n$  instead of  $r$ .
- p.40, proof of fact 6.1: The summation should go up to  $n$ .
- p.40, line -1, sums from  $k = 0$  to  $n$ , instead of  $k = 1$ , since there are  $n + 1$  constraints
- p.41, line 1: 'Let  $\gamma(x) := \sum_{k=0}^n \beta_k K_k(x)$ .
- p.41, line 3: There should be a  $\gamma(0)$  instead of a  $\gamma(x)$  on the right hand side.
- p.41, line 9, sum from  $k = 0$  and 3 lines later the same

## Lecture 7: The Brunn-Minkowski Theorem and Influences of Boolean Variables

- p.50, dictatorship influence: 1 if  $1 \in S$  instead of  $i \in S$ , same next line
- p.51, line 5: The power should be  $\frac{n}{b} - 1$ .
- p.51, line 8: The fraction should be  $\frac{1}{2^b - 1}$ . And in the big-omega we should write  $\frac{\log n}{n}$ .
- p.51, line 2 from the bottom: The influence of the  $x$  variable in the function  $f$  is equal to the number of mixed edges **in  $x$ -direction** divided by  $2^{n-1}$ .
- p.52, line 2,  $f(T)$  missing on the right side of the equation
- p.52, last line: The right hand side and the middle term should be divided by  $2^n$ .
- p.53, line 9: Write  $\hat{f}$  instead of *hat f*.
- p.53, line -2,  $\text{Inf}_f((S))$  too many brackets

## Lecture 8: More on the influence of the variables on boolean function

- p.55, Theorem 8.1:  $f : \{-1, 1\}^n \rightarrow \dots$  the  $n$  is missing
- p.58, line 2: say that proof starts here
- p.60, line 8: A factor 2 is missing, i.e. for  $i \in S$  it holds that  $f^{\hat{i}}(S) = 2^{\hat{i}}(S)$ .
- p.60, middle, ignore the 0 term because  $f(\emptyset) = 0$  instead of what is written
- p.60, line 10,17,18,19,20,21: A factor 4 is missing.
- p.62, line 6: Friedgut instead of Freidgut
- p.63, line -5, also Friedgut's instead of Freidgut's
- p.70, line -5, again Friedgut

## Lecture 9: Threshold Phenomena

(found nothing yet)