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 $X \to \mathbb{C}^*$ instead of $X \to \mathbb{C}$
- p.3, line 12: An 1 is missing in the denominator, i.e. $< \chi_j, \chi_k >= \frac{(\omega^{j-k})^n - 1}{\omega^{j-k} - 1}$
- p.3, last line: change the font on X, i.e. $\chi : X \to \mathbb{T}$
- 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 μ, i.e. $< f, g >= \frac{1}{|X|} \sum_{x \in X} f(x)g(x)$ and $< f, g >= \frac{1}{\mu(X)} \int_X f(x)g(x)d\mu(x)$
- 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 μ ... 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.

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

  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 infront and secondlast e_i should be e_j

$$2\sum < f, e_i >< f - \sum_{j=1}^{n} < f, e_k > e_j, e_i > -2\sum_{i}^{n} \lambda_i < f - \sum_{j=1}^{n} < f, e_j > e_j, e_i >$$

- 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 $< f, f >$ 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 $< f+g, f+g >=< f, f > + < f, g > + < g, f > + < g, g >$ and in complex case $< f, g >$ might not be the same as $< g, f >$.
- p.25, line 4, in the integral $\int g(u)ds$ the terme^{-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 '$+n^2$' not '$-n^2$'(...
- p.26, equation (4.2): The second arguments in the scalarprodutcs 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

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

- 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 $hatf$.
- p.53, line -2, $\mathrm{Inf}_f(()S)$ too many brackets

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

- p.55, Theorem 8.1: $f : \{-1, 1\}^n \to$ ... 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 $\hat{f(i)}(S) = 2\hat{f}(S)$.
- 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)