Homework 4 - Due Wed. Mar. 13th
Introduction to Harmonic Analysis and its Applications

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Homework Policies

As in homework 1.

Exercises marked by (*) are not mandatory, but give you extra credit that will accumulate throughout the course and may affect your final grade.

Study. Sections 5.3 and 5.4 in Chapter 2.

Exercises

Exercise 1 (50pts). Exercise 8, part (a), from chapter 3, on page 89, in Stein and Shakarchi's book on the explicit expression for computing sums using Parseval.

Exercise 2 (50pts). Prove Theorem 1.4 (Riemann-Lebesgue Lemma) in Chapter 3. Then do Exercise 13 from chapter 3, on page 92-92, in Stein and Shakarchi's book, on the decay of the Fourier coefficients for a $\mathcal{C}^s$ function.

(*) Exercise 16 parts (a)-(c) from chapter 3, on page 92-92, in Stein and Shakarchi's book on the uniform convergence of Fourier series of Lipschitz functions. The technique is a basic instance of the Littlewood-Paley method, on grouping Fourier coefficients in dyadic frequency rings.