

FOURIER ANALYSIS $\psi. 2 / 2015$

Bogges - Narcowich (2nd Ed.)

Chapter 1, exercises 3, 19, 20, 36

Ex: Write

$$\frac{1}{2\pi} \int_{-\pi}^{\pi} (x+t)^2 \frac{\sin(N+\frac{1}{2})t}{\sin(\frac{t}{2})} dt = ?$$

as a sum without integrals!

Ex: Construct a sequence of functions

$f_n: [0,1] \rightarrow \mathbb{R}$ such that

$$\lim_{n \rightarrow \infty} \int_0^1 f_n(x)^2 dx = 0$$

but nowhere $f_n(x) \rightarrow 0$ as $n \rightarrow \infty$. (However, always $f_{n_j}(x) \rightarrow 0$ at almost every point for some subsequence.)