

## Homework Set 10

due Monday, April 9

1. Problem 1 in Section 6.9.
2. Do Problem 2 in Section 6.9.
3. Copy and fill in the details for Example 2 in Section 6.9 of the textbook. Here you will be calculating the Fourier Series of  $f(t) = \begin{cases} t & t < \frac{1}{2} \\ 1 - t & t \geq \frac{1}{2} \end{cases}$ .
4. Do Problem 15 on the “Sampling Handout.”
5. Use the definition of adjoint to show that, for any complex number  $\lambda \in \mathbb{C}$  and any linear transformation  $L : V \rightarrow W$  between complex inner product spaces,  $(\lambda L)^t = \bar{\lambda} L^t$ .
6. Do Problem 4 in Section 7.2. *First check that the matrix is Hermitian.*
7. Read Problem 6 in Section 7.2. *First read Problem 5, which was proved in class.*

Notation: functions in the space  $L^2(S^1)$  can be written as  $f(\theta)$  where  $f$  is  $2\pi$ -period. The advantage of regarding these as functions on the circle  $S^1$  is that integration-by-parts has no boundary term, simply because the circle has no boundary (you could alternatively think of  $f(\theta)$  as periodic and observe that the boundary values cancel).