

Math 650, Winter 2001, Homework # 3
solve at least 7 out of 12 problems

1–11. Solve the following problems from Wojtaszczyk's "Mathematical Introduction to Wavelets": 1.3, 2.5, 2.7, 2.15, 3.5, 3.10, 3.12, 3.14, 4.8, 4.9, 4.12.

12. Let $\phi \in L^2(\mathbb{R})$. Show that the system $\{\phi(x - k) : k \in \mathbb{Z}\}$ is a frame with constants A and B (for the space it spans) if and only if

$$A\mathbf{1}_K(\xi) \leq \sum_{k \in \mathbb{Z}} |\hat{\phi}(\xi + 2\pi k)|^2 \leq B\mathbf{1}_K(\xi) \quad \text{for a.e. } \xi \in [-\pi, \pi],$$

where $K \subset [-\pi, \pi]$ is some measurable set of non-zero measure.