Foundations of Audio Signal Processing
Assignment 7

Giulia Baldini, Luis Fernandes, Agustin Vargas Toro

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Exercise 8.1

When $k = l \implies f(sinc(t-k) = f(sinc(l-k) \implies < f, f >= 1^2 = 1$.
But when $k \neq l \implies |k-l| \geq 1$ since $l, k \in \mathbb{Z}$, however, $\hat{f}(sinc(t-k)) = 1$ only when

$$x \in [k - 1/2, k + 1/2](1)$$

This means that the worst case is when both intervals coincide, i.e. $|k-l| = 1$. This means that

$$k - l = 1 \implies k = l + 1(2)$$

or $l - k = 1$. Then, replacing (2) in (1), both functions $f(t)$ are defined in:

$$[l - 1/2, l + 1/2] \wedge [l + 1/2, l + 3/2] \implies \int_{1/2}^{1/2} 1.1 d\omega = 0$$

In any other case, when $|k - l| > 1$, both functions don't intersect, so their inner prodduct is zero.

Exercise 8.2

Error 404

Exercise 8.3

You can find the solution for this exercise in the 'code' folder.