

ECE 732 Homework 12

Let $\phi(t)$ be a scaling function satisfying the recursive relationship

$$\phi(t) = \sum_{n=0}^{N-1} h(n)\sqrt{2}\phi(2t - n)$$

Note that this implies that the scaling filter has finite length N . Prove that if $\phi(t)$ has compact support (*i.e.*, there exist $a < b$ such that $\phi(t) = 0$ for $t < a$ or $t > b$), then the support of $\phi(t)$ is $0 \leq t \leq N$. In other words, prove that if $\phi(t)$ has compact support, then its support must be $0 \leq t \leq N$.