# Self Evaluation Quizzes

**Q 1.** Why the frequency response of $\phi(t)$ should not have zero at $w = 0$?
**Ans.** Frequency response of $\phi(t)$ at $w = 0$ is constant because of **lowpass** nature of $\phi(t)$.

**Q 2.** Prove that if the length of wavelet filter is $L$ then the support of scaling function $\phi(t)$ is $L - 1$?
**Ans.** As defined earlier, scaling function is given as,

$$\hat{\phi}(\Omega) = \left\{ \prod_{m=1}^{N} \frac{1}{2}.H\left(\frac{\Omega}{2^m}\right) \right\}.\hat{\phi}(0).$$

Now, the multiplication in frequency domain corresponds to convolution in time domain.
If we consider two functions $x[n]$ extending from 0 to $N$ and $y[n]$ extending from 0 to $M$. Now convolution of $x[n]$ and $y[n]$ will extend from 0 to $N + M$.
Similarly if wavelet filter $h[n]$ having length $L$ that is extending from 0 to $L - 1$.
Now for each iteration filter support squeezes by a factor $\frac{1}{2}$.
Hence the support of scaling function is the sum of

$$\left(\frac{L-1}{2}\right) + \left(\frac{L-1}{4}\right) + \left(\frac{L-1}{8}\right) + \left(\frac{L-1}{16}\right) + \ldots\ldots\ldots + \infty.$$

This sums up to $L - 1$.