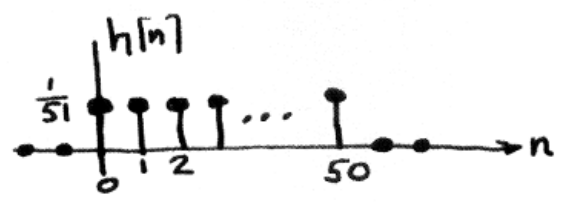**EXERCISE 5.12:** Determine the impulse response $h[n]$ of the 51-point causal running averager and determine the impulse response $\tilde{h}[n]$ for the 51-point centralized running averager.

SOLUTION

51-pt. CAUSAL RUNNING AVERAGE IS:

$$y[n] = \frac{1}{51} \sum_{k=0}^{50} x[n-k]$$

$$\Rightarrow h[n] = \frac{1}{51} \sum_{k=0}^{50} \delta[n-k]$$

51-pt CENTRAL RUNNING AVG:

$$\tilde{y}[n] = \frac{1}{51} \sum_{k=-25}^{25} x[n-k]$$

$$\Rightarrow \tilde{h}[n] = \frac{1}{51} \sum_{k=-25}^{25} \delta[n-k]$$