1.11 $K\psi_n(t) =$

$$\sqrt{2}\int_0^t s \sin\left(\frac{\pi(2n-1)}{2}s\right)ds +$$

$$\sqrt{2}\int_t^1 t \sin\left(\frac{\pi(2n-1)}{2}s\right)ds$$

$$\int_0^t s \sin\left(\frac{\pi(2n-1)}{2}s\right)ds =$$ (integrate by parts)

$$-\frac{2}{\pi(2n-1)}\left[s\cdot\cos\left(\frac{\pi(2n-1)}{2}s\right)\right]_0^t +$$

$$\frac{2}{\pi(2n-1)}\int_0^t \cos\left(\frac{\pi(2n-1)}{2}s\right)ds =$$

$$-\frac{2}{\pi(2n-1)}t\cdot\cos\left(\frac{\pi(2n-1)}{2}t\right) + \frac{4}{\pi^2(2n-1)^2}\sin\left(\frac{\pi(2n-1)}{2}t\right)$$

$$\int_t^1 \sin\left(\frac{\pi(2n-1)}{2}s\right)ds = \frac{2}{\pi(2n-1)}\cdot\cos\left(\frac{\pi(2n-1)}{2}t\right)$$

putting these together we get: $K\psi_n = \lambda_n\psi_n$ $\square$