Proof

Let $\varphi \in W'$, then

▶ $(S+T)'(\varphi) = \varphi(S+T)$ by defn' dual map

$\qquad\qquad = \varphi \cdot S + \varphi \cdot T$ by 3.9 Axler

$\qquad\qquad = S' + T'$

▶ $(\lambda T)'(\varphi) = \varphi(\lambda T)$ by definition dual map

$\qquad\qquad = \lambda(\varphi \cdot T)$ by 3.6 & 3.9 Axler

$\qquad\qquad = \lambda T'$