

$$\begin{aligned}\mathbf{a} \cdot \mathbf{b} &= \langle s, 3s, 4s \rangle \cdot \langle t, -t, 4t \rangle = (s)(t) + (3s)(-t) + (4s)(4t) \\ &= st - 3st + 16st = 14st\end{aligned}$$