Exercise 1

Calculate the dot product of $\mathbf{x} = (1, -1, 0, 2) \in \mathbb{R}^4$ and $\mathbf{y} = (1, 2, 3, 4) \in \mathbb{R}^4$.

Solution

To compute the dot product, multiply the vectors' respective components and add them.

$$\begin{aligned}\mathbf{x} \cdot \mathbf{y} &= (1, -1, 0, 2) \cdot (1, 2, 3, 4) \\ &= (1)(1) + (-1)(2) + (0)(3) + (2)(4) \\ &= 1 - 2 + 0 + 8 \\ &= 7\end{aligned}$$