Source task and conventions

For X of shape $(2, 3, 4)$, determine and check $\mathrm{len}(X)$.

Conventional solution and proof

For a NumPy array, length is the size of axis zero. Thus $\mathrm{len}(X) = 2$. The executable check creates $X = \mathrm{arange}(24).\,\mathrm{reshape}(2, 3, 4)$ and asserts both the shape and the length. This differs from $X.\texttt{size} = 24$ and $X.\texttt{ndim} = 3$.

Structural or analytic derivation

Think of X as a sequence of two 3×4 arrays. Length counts the outer sequence, while total scalar size is the product $2 \cdot 3 \cdot 4$. The distinction follows directly from the indexing map.