

$$1. \begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} v_1 \\ v_2 \end{pmatrix} = \begin{pmatrix} 2 \cdot v_1 \\ 0.5 v_2 \end{pmatrix}$$

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} \cancel{5} \\ 5 \\ \cancel{10} \\ 10 \end{pmatrix} = \begin{pmatrix} 10 \\ 5 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 0 \\ 0 & 0.5 \end{pmatrix} \begin{pmatrix} v_1 \\ v_2 \end{pmatrix} = \begin{pmatrix} 2 \cdot v_1 \\ 0.5 v_2 \end{pmatrix}$$

$$2. \begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 5 & 2 & 7 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$$

$$= \begin{pmatrix} 1 \cdot 1 + 2 \cdot 2 + 3 \cdot (-1) \\ 2 \cdot 1 + 1 \cdot 2 + 4 \cdot (-1) \\ 5 \cdot 1 + 2 \cdot 2 + 1 \cdot (-1) \end{pmatrix}$$

$$= \begin{pmatrix} 1 + 4 - 3 \\ 2 + 2 - 4 \\ 5 + 4 - 1 \end{pmatrix} = \begin{pmatrix} 2 \\ 0 \\ 8 \end{pmatrix}$$

$$3. 2 \cdot \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix} + \begin{pmatrix} 3 & -1 \\ 2 & 2 \end{pmatrix}$$

$$= 2 \cdot \begin{pmatrix} 4 & 5 \\ 4 & 3 \end{pmatrix} = \begin{pmatrix} 8 & 10 \\ 8 & 6 \end{pmatrix}$$

4.

The image shows handwritten mathematical work on grid paper. It features several matrices and vector diagrams. At the top left, there are two separate 2×2 matrices, each enclosed in large parentheses. The first matrix has entries $\frac{1}{\sqrt{2}}$ and $\frac{1}{\sqrt{2}}$ in the first row, and $\frac{1}{\sqrt{2}}$ and $\frac{1}{\sqrt{2}}$ in the second row. The second matrix has entries $\frac{1}{\sqrt{2}}$ and $\frac{1}{\sqrt{2}}$ in the first row, and $\frac{1}{\sqrt{2}}$ and $-\frac{1}{\sqrt{2}}$ in the second row. To the right of these, a vector $\begin{pmatrix} 1 \\ \frac{1}{\sqrt{2}} \end{pmatrix}$ is shown with a red arrow pointing upwards. A horizontal red arrow points to the right from the top-right element of this vector. Below the first matrix, there is a larger matrix with entries $\frac{1}{\sqrt{2}}$, $-\frac{1}{\sqrt{2}}$, and -1 in the first row, and 1 in the second row. To the right of this, another 2×2 matrix is shown with entries $\frac{1}{\sqrt{2}}$ and $-\frac{1}{\sqrt{2}}$ in the first row, and 0 and -1 in the second row. At the bottom right, there is a 2×2 matrix with entries 1 and 0 in the first row, and 1 and 0 in the second row. The paper has a watermark for 'LANDRE FLIP-CHART PAPIER • ART. 100050589'.