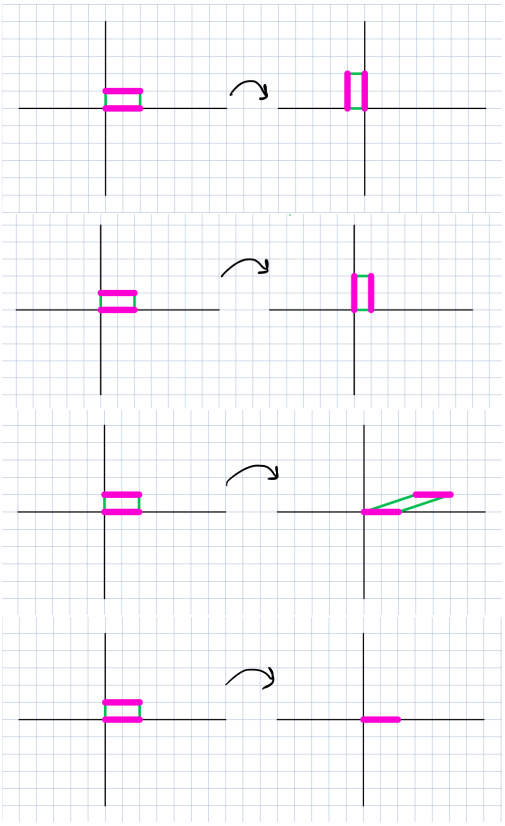
Midterm 2 review

November 2, 2022

1. Find the determinants of the linear transformations depicted below:



2. Let $M = \begin{bmatrix} 1 & 6 \\ 1 & 4 \\ 1 & 6 \\ 1 & 4 \end{bmatrix}$. Find an orthonormal basis for the image of M.

3. Let V be the image of the matrix M above. Let $\vec{v} = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$. Find $\text{proj}_V(\vec{v})$.

9. If $\vec{v}_1$ and $\vec{v}_2$ are linearly independent vectors in $\mathbb{R}^2$, what is the relationship between $\det\begin{bmatrix} \vec{v}_1 & \vec{v}_2 \end{bmatrix}$ and $\det\begin{bmatrix} \vec{v}_1 & \vec{v}_2^{\perp} \end{bmatrix}$, where $\vec{v}_2^{\perp}$ is the component of $\vec{v}_2$ orthogonal to $\vec{v}_1$?