1. **Matrix multiplication:** Let

\[
A = \begin{bmatrix} 1 & -1 \\ 3 & 2 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 0 & 2 \\ -4 & 1 \end{bmatrix}.
\]

What is \(AB\)? What is \(BA\)?

2. What is the dimension of a \(4 \times 2\) matrix times a \(2 \times 3\) matrix? Could you multiply them the other way around?

3. **Rotate:** Let

\[
\vec{y} = \begin{bmatrix} 0 \\ y \end{bmatrix}.
\]

What are the new coordinates if \(\vec{y}\) is rotated \(\theta\) (counter-clockwise)?

4. **Scale:** What scaling matrix could you use to get \([2 \ 3]^T\) from \([-5 \ 6]^T\)?

5. **Composition:** What transformations could we apply to the house below to rotate it 25 degrees about its center?