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Rotation and Reflection Matrices:

Identity matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Reflection over $y=x$ $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

Rotation by 90° $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$

Rotation by 180° $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

Rotation by p° $\begin{bmatrix} \cos p & -\sin p \\ \sin p & \cos p \end{bmatrix}$

Reflect over $p/2$ $\begin{bmatrix} \cos p & \sin p \\ \sin p & -\cos p \end{bmatrix}$

Determinant > 0 then it is a rotation

Determinant < 0 then it is a reflection

Reflection * Reflection = Identity Matrix

All Transformations preserve length, and rotation preserves the angle between vectors. Reflection flips the angle between vectors, making it negative if measured the same way.