WORKSHEET

1. Find the inverse of the transformation obtained by first rotating clockwise with angle $\pi/4$ and then reflecting about the line $7x_1 + 24x_2 = 0$. What happens if we first reflect and then rotate?

2. Find the matrix of the reflection about the plane $3x_1 - 2x_2 + 6x_3 = 0$. Find its inverse.

3. Find the inverse of the projection onto the plane $3x_1 - 2x_2 + 6x_3 = 0$.

4. For the matrix

$$B = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \end{bmatrix}$$

find a matrix A such that $BA = I_2$. How many solutions A does this problem have?

5. True or false?

(a) If $AB = I_n$ for two $n \times n$ matrices, then

- $\text{rref}\,(A) = I_n$;
- $\text{rref}\,(B) = I_n$;
- $\text{rref}\,[B|I_n] = [I_n|A]$.

(b) If $ad - bc = 1$, then

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}^{-1} = \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

(c) There exists an invertible 2×2 matrix A such that $A^2 = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$.

(d) The function $T \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} y \\ 1 \end{bmatrix}$ is a linear transformation.

(e) The matrix $\begin{bmatrix} 5 & 6 \\ -6 & 5 \end{bmatrix}$ represents a rotation combined with a scaling.

(f) The matrix $\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$ represents a reflection about a line.

(g) If $A^2+3A+4I_3 = 0$ for a 3×3 matrix A, then A must be invertible.