

Week 4
MATH 33A
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2.1.33 Consider the transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ that rotates any vector x by 45 degrees in the counterclockwise direction.

- (a) Show that this is a linear transformation.
- (b) Find the matrix representation of T .

2.2.7 Let L be the line in \mathbb{R}^3 that consists of all the scalar multiples of the vector $\begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}$. Find

the reflection of the vector $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ about the line L .

2.2.18 The linear transformation $T(x) = \begin{bmatrix} 0.6 & 0.8 \\ 0.8 & -0.6 \end{bmatrix} x$ is a reflection about a line. Find the line (in the form $y = mx + b$).

2.2.40 Let P and Q be two perpendicular lines in \mathbb{R}^2 . For a vector x in \mathbb{R}^2 , what is $proj_P(x) + proj_Q(x)$? Give this in terms of x . Draw a sketch to justify your answer.