

Math 136, Spring 2015, Homework 1

For practice, do all of the problems at the end of Sections 1-5 in Chapter 1 of Linear Algebra Done Wrong. The hand-in problems are generalizations of two of those.

In particular, you should be comfortable with multiplying a matrix with a vector to find the image of the vector, multiplying two matrices to compose two transformations and writing down the matrix of a transformation with respect to a given basis with the columns of the matrix being the images of the basis vectors in the domain.

To hand in

1. Let $\mathbf{T} : \mathbf{R}^2 \rightarrow \mathbf{R}^2$ be the **projection** of the points on the xy -plane to the line through the origin given by the equation $\alpha x + \beta y = 0$. Find the matrix of this transformation with respect to the standard basis on \mathbf{R}^2 .
2. Let $\mathbf{T} : \mathbf{R}^2 \rightarrow \mathbf{R}^2$ be the **reflection** of the points on the xy -plane through the line $\alpha x + \beta y = 0$. Find the matrix of this transformation with respect to the standard basis on \mathbf{R}^2 .

Bonus Do the first two question on \mathbf{R}^3 and the plane $\alpha x + \beta y + \gamma z = 0$.