

Math 236 work for Friday, Feb. 23

Exercise 1. Let $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be reflection across the x_1 -axis and $S: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be rotation around the origin through an angle of $\pi/2$ counterclockwise.

- (a) Is $T \circ S = S \circ T$, that is, is $(T \circ S)(\vec{x}) = (S \circ T)(\vec{x})$ for all $\vec{x} \in \mathbb{R}^2$?
Why or why not?

- (b) Let A and B be the standard matrices of T and S , respectively. What are A and B ?

- (c) For the matrix products AB and BA of that A and B , does $AB = BA$?
Why or why not?

Exercise 2. Let $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be reflection across the x_1 -axis and $S: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be reflection across the x_2 -axis.

(a) What transformation is $T \circ S$, that is, what is $(T \circ S)(\vec{x})$ for all $\vec{x} \in \mathbb{R}^2$?
(Think geometrically here!)

(b) What are the standard matrices A and B of T and S , respectively?
(*Hint:* What are the images of \vec{e}_1 and of \vec{e}_2 ? Think geometrically.)

(c) What is the matrix product AB here?