

Tensor Analysis and Applications 2019

Exercise 1

Due 4/4/2019

- 1.) Derive the coordinate expression for a 2D rotation matrix.
- 2.) Let $A \in \mathbb{R}^{n \times n}$ be a diagonal change of basis matrix (which is not the identity).
 - i.) Interpret A geometrically in terms of the basis vectors, i.e. what does A tell us about the basis vectors.
 - ii.) For the canonical (orthonormal) basis $\{\vec{e}_1, \dots, \vec{e}_n\}$ the coordinates v_i of a vector $\vec{v} \in \mathbb{R}^n$ are given by

$$v_i = \langle \vec{v}, \vec{e}_i \rangle.$$

Derive the analog equation for the basis described by the matrix A .