

Ex1: What is the geometrical meaning of the tensor $e \otimes e$ where e is a unit vector in \mathbb{R}^3 .

Ex2: Show that $u \times (v \times w) = [(w \cdot u)\mathbb{1} - w \otimes u]v$.

Ex3. Show that $(ST)^T = T^T S^T$

Ex4: Let Ω be a skew tensor of the form

$$\Omega(v) = w \times v \quad \forall v \in \mathbb{R}^3$$

show that

$$|\Omega|^2 = 2|w|^2.$$

Ex5. Show that for $u \cdot v \neq -1$, the tensor

$T = \mathbb{1} + u \otimes v$ is invertible:

① show that the tensor

$$S = \mathbb{1} - (1 + u \cdot v)^{-1} u \otimes v$$

satisfies $TS = ST = \mathbb{1}$

② show that $\det T = 1 + u \cdot v$