

EXERCISES OF WEEK FOUR (2014/09/29, 11:00AM)

Exercise 1. Given three vectors $a, b, c \in E_3$, let A be the matrix defined column-wise

$$A := (a|b|c).$$

Show that $\det(A) = a \cdot (b \times c)$.

Exercise 2. Let

$$\ell_1 := \ell(P, v), \quad \ell_2 := \ell(Q, w)$$

be two non-degenerate lines such that $v \times w = 0$. Show that either

$$\ell_1 = \ell_2 \text{ or } \ell_1 \cap \ell_2 = \emptyset.$$

Exercise 3. Suppose that we have two non-degenerate lines

$$\ell := \ell(P, v), \quad \ell' := \ell(Q, w).$$

in the plane. We can define a distance between ℓ and ℓ'

$$d(\ell, \ell') := \inf\{d(R, R') \mid R \in \ell, R' \in \ell'\}.$$

Try to express the distance in terms of P, Q, v, w .

Exercise 4. Find the area of the polygon with vertices given by the points

$$P(0,0), \quad Q(2,3), \quad R(5,6), \quad T(1,5).$$