

MATH 4140/5140. HOMEWORK 10
due Wednesday, April 20

Note: All numbered exercises are from Erdmann–Holm ([EH]).

Let k be a field.

(1) Read Chapter 5 of [EH].

(2) Show that for any k -algebras A_1, A_2, \dots, A_r , we have

$$(A_1 \times A_2 \times \cdots \times A_r)^{\text{op}} \cong A_1^{\text{op}} \times A_2^{\text{op}} \times \cdots \times A_r^{\text{op}}$$

as algebras.

(3) Prove that for any division algebra D over k , the transpose map

$$M_n(D^{\text{op}}) \rightarrow (M_n(D))^{\text{op}}, \quad X \mapsto X^T$$

is an algebra isomorphism.

(4) Exercise 5.1.

(5) Exercise 5.2. (*Hint:* Proposition 1.29 and Example 1.30 may help.)

(6) Exercise 5.9.