

MATH 4140/5140. HOMEWORK 2
Due Wednesday, January 26

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

- (1) Exercise 1.4.
- (2) Exercise 1.5.
- (3) Exercise 1.6.
- (4) Exercise 1.8.
- (5) Exercise 1.9.
- (6) Exercise 1.14.
- (7) Exercise 1.18.

Let k be a field below.

- (8) Let $\varphi : A \rightarrow B$ be a k -algebra homomorphism. Show that $\ker \varphi$ is a two-sided ideal of A and $\operatorname{im} \varphi$ is a subalgebra of B .
- (9) Prove that for any k -algebra A and any element $a \in A$, the evaluation map $\operatorname{Eval}_a : k[t] \rightarrow A, \sum \lambda_j t^j \mapsto \sum \lambda_j a^j$ is an algebra homomorphism.