Math 4140/5140. Homework 4

Due Wednesday, February 16

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

Let k be a field below.

(1) Read Sections 1.3 and 2.1–2.5 of [EH].

(2) Let A, B be k-algebras, let M be a B-module, and let $\varphi : A \to B$ be an algebra homomorphism. Without using the language of representations, prove directly that M is automatically an A-module under the action $a \cdot m = \varphi(a) \cdot m$ for all $a \in A$ and $m \in M$. (See also Lecture 12 for an explanation of this fact in terms of representations.)

(3) Let A be an k-algebra and let M be an A-module. Show that if N is a submodule of M, then N is necessarily a subspace of M.

(4) Exercise 2.1.

(5) Exercise 2.3.

(6) Exercise 2.6.

(7) Exercise 2.10.

(8) Exercise 2.14.