

Date due: April 13, 2009.

This week in class I expect to cover pages 471 to 477 in Rotman's book. There are several things in Section 7.4 which we will not do, and which I think fall outside the syllabus. The results we will not do are 7.58, 7.60 - 7.62, 7.68-7.75.

We will hold Quiz 5 April 27 and Quiz 6 on May 4. This is because the Algebra preliminary exam is on April 20.

Hand in only the 5 starred questions.

Section 7.4 page 486 nos. 7.40, 7.43, 7.49, 7.50, 7.51*, 7.52*, 7.53*.

ZZZ* (Fall 2002, qn. 4) (11%) Let R be a ring with a 1 (which we denote 1_R) and P a projective left R -module.

(a) (3%) Show that P is necessarily a unital R -module, that is, $1_R \cdot x = x$ for all $x \in P$.

[For this question we do not assume as an axiom that all modules are unital.]

(b) (8%) Suppose that I is a 2-sided ideal in R and that, when regarded as a left R -module, I is projective. Show that IP is projective as a left R -module.

AA* Prove that the following are equivalent for a ring R : (i) Every left R -module is projective, (ii) Every left R -module is injective.