Incomplete list of typos and other remarks

Rotman: An Introduction to Homological Algebra (2e)

December 31, 2008

Covers Chapters 1–3, 5.1-5.2, page 542. Not all problems were assigned, so some typos may have been missed.

1 Typos

These are typos.

Page 3, Line 17: dx, not da.

Page 15, Line -7: "has as" instead of "asa".

Page 30, Line 3: t_{n-1}, not t_n.

Page 35, Exercise 1.13: "endomorphism"

Page 48, Proposition 2.20 (iv): the terms "projections" and "injections" are reversed.

Page 38, Example 2.2:"The group ring kG is the set ...". A few lines later the notation kG is used, but was not previously defined.

Page 39, Corollary 2.21: last line: "(iv) $\Rightarrow$ (v)".

Page 78, Proposition 2.54 (iv): "$\mathrm{Hom}_S(\square, B)$", not "$\mathrm{Hom}_S(A, \square)$."

Page 80, Line 17: "universal"

Page 82, Line -7: one missing subscript "k" on an "$\otimes$"

Page 85, Line -16: append $+E$ to displayed definition of f.

Page 88, Line -9: "R" instead of "r" in subscript of "$\otimes$".

Page 93, Corollary 2.77: the subscript on the "$\otimes$" should be "R" in (i) (and maybe in (ii) also).

Page 103, Line 10: specify that the x_{n_i} are nonzero.

Page 119, Line 7: "E_k", not "E_i"

Page 121, Line -10: Unable to assume that $1 \in I$, so the proof does not work. Instead, as in (i), define $c = \frac{f(a)}{a}$ and define $\tilde{f} : R \to E$ by $\tilde{f}(r) = rc = r\frac{f(a)}{a} = \frac{rae_a}{a} = re_a$. Then $\tilde{f}$ is an R-map extending f.

Page 125, Line -3: insert "proper": "If E is a proper essential extension ..."

Page 133, Line -12: "a_j," not "b_j" (near end of line)

Page 142, Line 7: "B," not "A".

Page 147, Line 3: Exact sequence should start "$0 \to A'$".

Page 147, Line -17: Replace "row" with "column".
Page 149, Line 5: Replace "a_i" with "a_1".
Page 149, Line 9: "Lemma 3.68."
Page 149, Line 12: Second item in the sequence of equalities should be

$$\sum_j a_j \otimes \left(\sum_i r_{ji} h'_i \right).$$

Page 217, Line 1: Replace "C" with "B" (three subscripts).
Page 217, Line 9: Remove extra comma.
Page 218, Line 2: Replace "C" with "X".
Page 235, Line 14, "$b_n + J^n M$".
Page 237, first diagram: φ^* maps go in the opposite direction.
Page 237, Line 11: In the definition "$\varphi^i_j : M_i \to M_j$", not "$M_j \to M_i$."

2 Typos/Remarks

These are either typos or remarks on style.

Page 3, Line 9: It appears that m and the m_i should be 1 in this first integral, to agree with Green's Theorem. Perhaps a rewording is in order to allow the integral to be stated as it is.

Page 30, Line 5: Should i be bounded above by n? Should the expression be piecewise with three pieces, that is, since the $i = 0$ case was separated out, should not also the $i = n$ case be separated out?

Page 39, Lemma 2.3: It appears that "for all $f, g, \in \mathrm{Hom}_R(A, B)$" should be appended to the statement.

Page 39, Proposition 2.4: the term "additive functor" is used before it is defined (next page).

Page 52, Proposition 2.26: why angle brackets in the displayed line? Why not parentheses?

Page 53, Line -18: say that the jth injection is from A_j to B? Give it a name? (make it parallel to the jth projection?)

Page 86, Theorem 2.65: "Let A_R be a right R-module ..."

Page 87, Line -17: "coproduct" is used before its definition.

Page 108, Definition: delete "(over some ring R)". If desired, add "Let R be a ring" at the start.

Page 125, Definition: in contrast to the definition of essential extension given on page 72 of the first edition, here the author generalizes so that M need not be a submodule of E. Under the old definition, Exercise 3.21 is straightforward, but, for example, we are unable to see how to complete Exercise 3.21 with this new definition.

Page 126, Line 11: Consider subscript notation for restrictions?: "$\pi|_{i(M)}$".

Page 132, Proof (ii): It's not quite Proposition 2.65 that applies here, it's the other (unstated) version of Proposition 2.65 that applies here.

Page 133, Line -5: Replace "lemma" with "Lemma 3.47".

Page 148, Line 9: Replace "x_js" with "x_j."

Page 223, Line 5: "$\sqcup_A$" for "$\cup_A$"?

Page 223, Proof: why use X instead of Y?

Page 224, Line -12: Add word "morphism": "a unique morphism ..."

Page 225, Line 7: Add word "morphism": "a unique morphism ..."

Page 230, Line 2: Add "over I": "an inverse system in $\mathcal{C}$ over I is an ..."

Page 230, Example (i): Relabel the ordering so that $1, 2, 3$ match A, B, C, as in Example 5.18, page 233.

Page 230, Example (iii): Does this apply only to categories of modules? Or more generally? Needs rewording.

Page 232, Remark: Why choose to use φ here instead of ψ?

Page 237, Line 1: Explain what g' is, e.g., "for some g' in A".

Page 239, Example 5.24 (ii): Presumably this applies to modules only.

3 Remarks

There's a general inconsistency of notation. One of many examples: At the top of page 14, the author uses M and N for two modules. At the top of page 15 he uses M and M' instead. Why switch (even if in one case the modules are left R-modules and in the other, right R-modules)? Perhaps it is the author's intent to make the reader become comfortable with a variety of circumstances.

There are terms that are defined but do not appear in the index. For example, "representation" on page 37.

Page 11, footnote: a graduate student claimed that the final n should be $n + 1$, but I did not attempt to verify this claim.

Page 19, Line -3: Why use A? Why not use C, as was done in part (i)?

Page 26, Corollary 1.18 (ii): the second sentence seems awkwardly worded. Perhaps: "For each $C \in \mathcal{C}$, if $\sigma_C = \eta^*$ and $\tau_C = \psi^*$, then ..."

Page 38, Example 38: It's not clear why the function δ_y was defined, since it does not seem to appear in the sequel.

Page 41: the wording of the definition of submodule is unnecessarily sloppy.

Page 64, Proof, (iii): Can't a direct proof be used? From "hence": let $b \in \ker p$. Then $hb = h'pb = h'0 = 0$, and thus $b \in \operatorname{im} i$.

Page 77, Corollary 2.53: Conditions on A and B are not clearly stated. Perhaps before (i) say that A is an (R, S)-bimodule and that B is a left R-module. (OK, it's given in (i) that A is a bimodule, but the rest is assumed after that.)

Page 83, Corollary 2.61: proof uses the undefined term "k-trilinear".

Pages 88-89: why not give Proposition 2.70 before Proposition 2.68, which uses Proposition 2.70?

Page 99: The definitions are incomplete in the sense that they assume information given previously. The definition of lifting should specify $p : A \to A''$, while that of projective module should specify that $p : A \to A''$ and $h : P \to A''$ are R-maps.

Page 100, Line -5: it's not clear why or if it's appropriate to mention retract here, noting that retract was defined for a submodule.

Page 148, Remark: I found it necessary to expand on this remark when presenting it.

Page 219, Line 14: Why choose lower case letters for objects of the category here? Every other general object has been upper case.