

**"SYMMETRIES OF ALGEBRAS, VOLUME 1" BY C. WALTON
UPDATES AND CORRECTIONS**

Last updated: March 26, 2026

Mathematical clarifications.

§1.2.7, page 35. First paragraph: "any monoid N " \rightarrow "any totally ordered monoid N ".

§1.2.7i, page 36. Presentation of quantum exterior algebra is $\Lambda_q(v_1, \dots, v_n) := \mathbb{k}\langle v_1, \dots, v_n \rangle / (v_i^2, v_i v_j + q v_j v_i)_{1 \leq i < j \leq n}$.

§2.4.4, pages 97–99. A Morita equivalence between (\mathbb{k}) -algebras is an equivalence between their *linear* categories of modules. In line -2 of page 97, replace "as categories" with "as linear categories". Add "as linear categories" at the beginning of line 3 in the statement of Theorem 2.18. In lines 2 and -3 of the proof of Theorem 2.18, and in the claim statement, replace "functors" with "linear functors". In lines 5 and 8 of the proof of Theorem 2.18, replace "of categories" with "of linear categories".

§2.9, page 120. Proposition 2.61: "equivalence" \rightarrow "linear equivalence". Replacement for the proof of Proposition 2.61: "Then, there exist projective covers $\{P(X_i)\}_{i=1}^n$ in \mathcal{C} ; let $P := \square_{i=1}^n P(X_i)$ be their biproduct in \mathcal{C} . Now take $A := \text{End}_{\mathcal{C}}(P)^{\text{op}}$, [...] $A\text{-FdMod}$ is linearly equivalent to \mathcal{C} via the functor: $\mathcal{C} \rightarrow A\text{-FdMod}$, $Y \mapsto \text{Hom}_{\mathcal{C}}(P, Y)$."

Various locations, starting on page 162. The notation $\text{FdVec}_G / \text{FdVec}_G^\omega$ should be used in place of $\text{Vec}_G / \text{Vec}_G^\omega$ when referring to a rigid category. Replace: one spot in Table 3.1 on page 162; one spot in line -3 on page 182; three spots in Remark 4.69 on page 254; two spots in Example 4.95 on page 265; all (fifteen) categories should have the prefix Fd in Example 4.98 on page 266; two spots in Exercise 4.57 on page 286; one spot in Exercise 4.61 on page 287; one spot in Exercise 4.62 on page 287; and both categories should have the prefix Fd in Exercise 4.63 on page 287. The notation FdVec_G and FdVec_G^ω should be added to the Index of Notation.

Moreover, the notation $\text{FdVec}_N / \text{FdVec}'_G$ should be used in place of $\text{Vec}_N / \text{Vec}'_G$ when referring to a potential rigid category. Replace two spots in Table 3.1 on page 162.

§3.11.3, page 188; Exercises 3.40–3.42. Add to beginning of line -4: "A monoidal category is **closed monoidal** if it is both left and right closed monoidal." Then, continue with "Examples of ... Exercise 3.42." In Exercises 3.40 and 3.41, line 1: replace "closed monoidal" with "right/left closed monoidal". Update in Index of Terminology.

§3.15, page 191. In Figure 3.15, replace "Id $\cong (-)^{**}$ " (connected to the Pivotal box) with "Id $\cong (-)^{\otimes}$ ".

§4.3.1, pages 218-219. In Figure 4.7, the right region commutes by the naturality of ℓ and of ε , and a triangle identity. In Figure 4.8, $G^{(-2)}$ should be replaced by $G^{(2)}$. (*Thanks to Albert Xu*)

§4.4.1i, page 223. Figure 4.9: The right hand side of both associativity diagrams should have curved strings connecting to the straight string, one above the other. (*Thanks to Fabio Calderón Mateus*)

§4.5.1ii, page 236. Line 3: Replace "can be remedied if B is a" with "can be remedied if A is a".

§4.5.2iii, page 238. In Lemma 4.44, add the hypothesis: "Assume $(A \otimes -)$ and $(- \otimes A)$ are right exact." Also, in line -6, add "when $(A \otimes -)$ and $(- \otimes A)$ are right exact endofunctors of \mathcal{C} ."

§4.6.3, page 242. Change $\mathbb{N}\text{-GrAlg}_A(\mathcal{C})$ to $\mathbb{N}\text{-GrMod}_A(\mathcal{C})$ (twice), and change $\mathbb{N}\text{-GrAlg}(\mathcal{C})_A$ to $\mathbb{N}\text{-GrMod}(\mathcal{C})_A$, and change $\mathbb{N}\text{-GrAlg}_{B_1}(\mathcal{C})_{B_2}$ to $\mathbb{N}\text{-GrMod}_{B_1}(\mathcal{C})_{B_2}$. Update in Index of Notation.

§4.8.2, page 252. Line 6: "The **Deligne product** of \mathcal{P} and \mathcal{Q} is roughly a category $\mathcal{P} \boxtimes \mathcal{Q}$". (This is defined precisely in Volume 2.)

§4.10.2, page 267. Line 4: " $\text{Hom}_{\mathcal{M}}$ " \rightarrow "Hom" (twice).

§4.14, page 276. In Exercise 4.2(a) after "if and only if A is a \mathbb{k} -algebra", add the condition "and a left G -module". In Exercise 4.2(b), replace " $g \triangleright p_{g'} := p_{g'g}$ " with " $g \triangleright p_{g'} := p_{g'g^{-1}}$ ".

Minor updates.

§1.0, page 15. Line -3: "are provided are" \rightarrow "are provided in".

§1.1.4ii, page 23. Remove the definition of nondegenerate bi/multilinear forms here and in the appendix. Nondegeneracy will be discussed in more detail in Volume 2, and is not used in Volume 1.

§1.3.2, page 39. Line 9: "(left) module map" \rightarrow "a (left) module map"

§1.3.3, page 40. Line 7: the " (A, A) -bimodule" \rightarrow "an (A, A) -bimodule".

Line 16: "bimodule map" \rightarrow "a bimodule map".

§1.4.3i, page 46. Prop. 1.20, line 2: "a (A, B_2) -bimodule" \rightarrow "an (A, B_2) -bimodule".

§2.2.1v, page 79 / Indices. Add " $\vec{0}_{X,Y}$ " to the index of notation.

§3.1.2i, pages 137. Definition of N_{\leq} : "partial ordering \leq " \rightarrow "total ordering \leq ".

§3.3.1, pages 148. Add to line 9 (skipping diagram), "Isomorphic \mathcal{C} -module categories are defined likewise."

§4.1.3, page 209. Rename section as "Enriched endomorphism algebras".

§4.2.1, page 211. Line 2 in the proof of Proposition 4.13: "morphism $\alpha' : I \rightarrow A$ such that $\phi_{\text{obj}} \alpha' = \vec{0}_{A'}$ " \rightarrow "a morphism $\alpha' : I \rightarrow A$ such that $\phi_{\text{obj}} \alpha' = \vec{0}_{I,A'}$ ".

§4.4.1ii, page 224. Add "where $\triangleright_{A \otimes N} := m_A \otimes \text{id}_N$ " and "where $\triangleright_{A \otimes M/N} := m_A \otimes \text{id}_{M/N}$ ", respectively, in the definition of a left A -sub/quotient module in \mathcal{C} .

§4.4.3 and elsewhere. "Eilenberg-Moore" \rightarrow "Eilenberg–Moore".

§4.5.2iii, page 237. In Proposition 4.42, add "(e.g., \mathcal{C} is rigid)" to the end of the first sentence.

§4.5.2iii, page 238. Line 5 of the proof of Lemma 4.44: Add full stop.

§4.8, page 248. Line 7,8 of section: Replace \sim with \simeq .

§4.8.2, page 252. Line -12: Replace F in display with $F := \underline{\text{Hom}}(M, -)$.

§4.9.3, page 258. Line 6: "an algebra A " \rightarrow "a nonzero algebra A ".

§4.14, page 286 / Indices. From Exercise 4.58: Add "invariant subalgebra" to the index of terminology and " A^G " to the index of notation.

Various places. Uncapitalize "Hom"/"End" when discussing internal homs/ends or hom objects.