

MacLane, Saunders; Birkhoff, Garrett

Algebra. 3rd. ed. (English) [Zbl 0641.12001](#)

New York etc.: Chelsea Publishing Company. xix, 626 p. \$ 28.50 (1988).

Nearly any ten years there seems to arrive a new edition of this now classical book the review of which (1st edition 1967; [Zbl 0153.324](#), 2nd edition 1979; [Zbl 0428.00002](#)) the reviewer hardly can improve. The main advantage of the authors had been the introduction of thoroughly categorical concepts into algebra. Nowadays nobody wonders at this but perhaps at “universal constructions” which have faded out. On the other side, the concept of a group acting on a set, which is essential, e.g. for Galois theory, is not equally clearly worked out, not even in categorical terms. I also miss ‘normal bases’ in the index (not only there!), and ‘finite fields’ only cover two pages. As an annex the authors attend a chapter on affine and projective geome extensions of the residue fields, the pair $(S^1, L^1(I))$ is independent of the generating sequence \mathfrak{f} and is defined to be the first universal link of I . By iterating this process i times one gets the i -th universal link $(S^i, L^i(I))$. The ideal $L^i(I)$ is linked to IS^i in i steps.

The significance of the above construction lies in the following result proved in the cited paper: If R/I is Cohen-Macaulay and I_i is an ideal linked to I in i steps then the pair $(S^i, L^i(I))$ is essentially a deformation of the pair (R, I_i) . This means that there exists a pair (T, J) which can be obtained from each of $(S^i, L^i(I))$ and (R, I_i) by a finite succession of the following operations: deformation, localization, purely transcendental extension of the residue field. Further, if i is even then $(S^i, L^i(I))$ is essentially a deformation of (R, I) .

The technique of universal linkage described above is applied to obtain various results on the structure of licci ideals and, in particular, to describe for R/I (R regular, I licci) the singular (resp. Gorenstein) locus and the divisor class group and some interrelations among these.

Reviewer: [B.Singh](#)

MSC:

- [12-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to field theory
- [12Fxx](#) Field extensions
- [13-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to commutative algebra
- [00A05](#) Mathematics in general
- [51-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to geometry

Cited in 1 Review Cited in 10 Documents
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Keywords:

[Gorenstein](#); [divisor class group](#)