

COTORSION THEORIES

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Cotorsion theories were introduced by L. Salce in 1979 in the category of abelian groups. But they occur naturally in many abelian categories and are closely related to Quillen's homotopical algebra. We will give the definitions, give several examples and then give some of the basic homological notions of cotorsion theories.

GORENSTEIN FLAT MODULES

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The notion of a Gorenstein projective module generalizes M. Auslander's notion of a finitely generated module of G-dimension 0. There is also a natural way to define Gorenstein flat modules and so also Gorenstein cotorsion modules as comprising the orthogonal class. We define these modules and give their classification over certain rings. Then we give the argument that over any right coherent ring all modules have Gorenstein flat covers and Gorenstein cotorsion envelopes.

TOWARDS A COGALOIS THEORY OF COVERS

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An algebraic closure of a field is an envelope in the category of fields with respect to the class of algebraically closed fields. So there is a natural way to generalize Galois groups when envelopes exist in a category with respect to some class of objects. In the dual situation we have coGalois groups. we will consider the coGalois groups of torsion free covers over Dedekind domains. We impose a natural topology on these and show that over the ring of integers such a coGalois group is compact if and only if it is the product of finite dimensional p -adic Lie groups with the product over all primes p .