

Commutative Ring Theory Days 2010

May 19-20-21, 2010

Roma, Italy

MULTIPLICATIVE INVARIANTS AND LENGTH FUNCTIONS OVER VALUATION DOMAINS

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The notion of generalized length functions for modules over a commutative ring R was given by Northcott and Reufel in 1965. They described length functions over valuation domains. We define a multiplicative invariant as a map $\mu : \text{Fin}(R) \rightarrow \Gamma$, where (Γ, \cdot, \leq) is a partially ordered semigroup, such that $\mu(X) = \mu(Y)\mu(X/Y)$, for $Y \subseteq X$ finitely generated R -modules. We prove some results on finitely generated modules over valuation domains, that allow us to get a new description of length functions, through a universal property of multiplicative invariants.

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