

A GENERALIZATION OF THE AUSLANDER-BUCHSBAUM FORMULA

ABSTRACT. Let R be a local ring, and let M and N be nonzero finitely generated R -modules. In this paper we demonstrate the equality

$$\sup\{i \mid \operatorname{Tor}_i^R(M, N) \neq 0\} = \sup\{\operatorname{depth} R_p - \operatorname{depth} M_p - \operatorname{depth} N_p \mid p \in \operatorname{supp} M \cap \operatorname{supp} N\},$$

provided either

- (1) M has finite projective dimension, or
- (2) R is either a complete intersection or a Golod ring, and the left-hand side is finite.