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CHARACTERIZATION AND EXAMPLES OF COMMUTATIVE ISO-ARTINIAN RINGS

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Abstract: Noetherian rings have played a fundamental role in commutative algebra, algebraic number theory, and algebraic geometry. Along with their dual, Artinian rings, they have many generalizations, including the notions of iso-Noetherian and iso-Artinian rings. In this paper, we prove that the Krull dimension of every iso-Artinian ring is at most one. We then use this result to provide a characterization of iso-Artinian rings. Specifically, we prove that a ring R is iso-Artinian if and only if R is uniquely isomorphic to the direct product of a finite number of rings of the following types: (i) Artinian local rings; (ii) non-Noetherian iso-Artinian local rings with a nilpotent maximal ideal; (iii) non-field principal ideal domains; (iv) Noetherian iso-Artinian rings A with $\operatorname{Min} A$ being a singleton and $\operatorname{Min} A \subsetneq \operatorname{Ass} A$; (v) non-Noetherian iso-Artinian rings A with $\operatorname{Min} A$ being a singleton and $\operatorname{Min} A \subsetneq \operatorname{Ass} A$; (vi) non-Noetherian iso-Artinian rings A with a unique element in $\operatorname{Min} A$ that is not maximal, and $\operatorname{Min} A = \operatorname{Ass} A$. Several examples of these types of rings are also provided.

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