integrity characterized by places

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Theorem. Let R be a subring of the field K, $1 \in R$. An element α of the field is integral over R if and only if all http://planetmath.org/PlaceOfFieldplaces φ of K satisfy the implication

$$\varphi \text{ is finite in } R \quad \Rightarrow \quad \varphi(\alpha) \text{ is finite.}$$

1. Let R be a subring of the field K, $1 \in R$. The integral closure of R in K is the intersection of all valuation domains in K which contain the ring R. The integral closure is integrally closed in the field K.

2. Every valuation domain is integrally closed in its field of fractions.