TRANSFER OF INJECTIVITY UNDER FAITHFULLY FLAT EXTENSIONS

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ABSTRACT. Let $R$ be a commutative ring and let $S$ be an $R$-algebra. It is well-known that if $N$ is an injective $R$-module, then $\text{Hom}_R(S, N)$ is an injective $S$-module. The converse is not true, even if $R$ is a regular local ring and $S$ is its completion. In this talk, I will prove the following:

**Theorem** Let $\phi : R \to S$ be a faithfully flat homomorphism of commutative rings. Let $N$ be an $R$-module. If $\text{Hom}_R(S, N)$ is an injective $S$-module and $\text{Ext}^1_R(S, N) = 0$, then $N$ is an injective $R$-module.

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