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Let R be a local ring and let M^\vee denote the Matlis dual of an R -module M . Given R -modules M and M' , Hom-tensor adjointness provides an isomorphism $\mathrm{Tor}_i^R(M, M')^\vee \cong \mathrm{Ext}_R^i(M, M'^\vee)$. Finding similar descriptions of $\mathrm{Ext}_R^i(M, M')^\vee$ requires a subtler approach. Belshoff shows that if M and M' are Matlis reflexive, then $\mathrm{Ext}_R^i(M, M')$ and $\mathrm{Tor}_i^R(M, M')$ are Matlis reflexive and $\mathrm{Ext}_R^i(M, M')^\vee \cong \mathrm{Tor}_i^R(M, M'^\vee)$. We extend these results to certain situations where M and M' are not necessarily Matlis reflexive. (Received September 19, 2010)