Problem 1 (3.1.1)**.** *Show that* $\mathrm{Ext}(H, G)$ *is a contravariant functor of* H *for fixed* G *and covariant for fixed* H*.*

Proof. □

Problem 2 (3.1.2)**.** *Show that the maps* $G \xrightarrow{n} G$ *and* $H \xrightarrow{n} H$ *multiplying each element by the integer* n *induce multiplication by* n *in* $\mathrm{Ext}(H, G)$*.*

Proof. □

Problem 3 (3.1.3)**.** *Regarding* $\mathbb{Z}_2$ *as a module over the ring* $\mathbb{Z}_4$*, construct a resolution of* $\mathbb{Z}_2$ *by free modules over* $\mathbb{Z}_4$ *and use this to show that* $\mathrm{Ext}^n_{\mathbb{Z}_4}(\mathbb{Z}_2, \mathbb{Z}_2)$ *is nonzero for all* n*.*

Proof. □