

$$A \xrightarrow{\delta} B \xrightarrow{\epsilon} C \xrightarrow{\zeta} D \xrightarrow{\eta} E$$

$$0 \rightarrow \text{Coker } \delta \rightarrow C \rightarrow \text{Ker } \eta \rightarrow 0$$

$$H_{k+1}(B;G) \rightarrow H_k(Z;G) \rightarrow H_k(C;G) \rightarrow H_k(B;G) \rightarrow H_k(Z;G)$$

$$B_k \otimes G \xrightarrow{\delta_k \otimes 1_G} Z_k \otimes G \rightarrow H_k(C;G) \rightarrow B_{k-1} \otimes G \xrightarrow{\delta_{k-1} \otimes 1_G} Z_{k-1} \otimes G$$

$$0 \rightarrow \text{Coker } \delta_k \otimes 1_G \rightarrow H_k(C;G) \rightarrow \text{Ker } \delta_{k-1} \otimes 1_G$$

$$B_k(C) \otimes G \xrightarrow{\delta_k \otimes 1_G} Z_k(C) \otimes G \rightarrow H_k(C) \otimes G \rightarrow 0$$

$$0 \rightarrow H_k(C) \otimes G \rightarrow H_k(C;G) \rightarrow \text{Tor}(H_{k-1}(C), G) \rightarrow 0 \stackrel{\cong \text{Coker } \delta_{k-1} \otimes 1_G}{\sim}$$

$$\text{Hom}(B, A) \quad B \triangleleft A$$

$$f: A \rightarrow A'$$

$$\text{Hom}(A, B) \quad A \triangleleft B$$

$$\begin{array}{ccc} \text{Hom}(B, A) & \longrightarrow & \text{Hom}(B, A') \\ \textcircled{g: B \rightarrow A} & \xrightarrow{f} & \textcircled{fg: B \rightarrow A'} \end{array}$$

$$(A \otimes B) \triangleleft C \cong A \triangleleft (B \triangleleft C)$$

$$\begin{array}{ccc} \text{Hom}(A', B) & \longrightarrow & \text{Hom}(A, B) \\ \textcircled{h: A' \rightarrow B} & \xrightarrow{f} & \textcircled{hf: A \rightarrow B} \end{array}$$