$$\cdots \xrightarrow{\ d\ } {}_{n+1}\mathtt{L} \xrightarrow{\ d\ } {}_{n}\mathtt{L} \xrightarrow{\ d\ } {}_{1}\mathtt{L} \xrightarrow{\ d\ } {}_{0}\mathtt{L} \xrightarrow[\text{res}]{\text{proj}} \mathtt{L}$$

$$\square \text{ right cov } \begin{cases} \cdots \xrightarrow{\ d\ } {}_{n+1}\mathtt{L}\square \xrightarrow{\ d\ } {}_{n}\mathtt{L}\square \xrightarrow{\ d\ } {}_{1}\mathtt{L}\square \xrightarrow{\ d\ } {}_{0}\mathtt{L}\square \xrightarrow[\text{res}]{\text{proj}} \mathtt{L}\square \\[4pt] \underset{n}{\mathtt{L}\blacksquare} = {}_{n}\mathtt{L}\blacksquare = \overbrace{{}_{n}\mathtt{L}\boxbslash} \ulcorner \overbrace{{}_{n}\mathtt{L}\boxslash} \end{cases}$$

$$\mathtt{1}\lhd \text{ right cov } \begin{cases} \mathtt{1} \xleftarrow[\text{res}]{\text{proj}} \mathtt{1}\lhd_{0}\mathtt{L} \xleftarrow{\ \partial\ } \mathtt{1}\lhd_{1}\mathtt{L} \xleftarrow{\ \partial\ } \mathtt{1}\lhd_{n}\mathtt{L} \xleftarrow{\ \partial\ } \mathtt{1}\lhd_{n+1}\mathtt{L} \xleftarrow{\ \partial\ } \cdots \\[4pt] \underset{n}{\mathtt{1}\blacktriangleleft\mathtt{L}} = \mathtt{1}\blacktriangleleft_{n}\mathtt{L} = \mathtt{1}\lhd_{n}\mathtt{L} \ulcorner \mathtt{1}\lhd_{n}\mathtt{L} \end{cases}$$

$$\square \text{ left contra } \begin{cases} \cdots \xleftarrow{\ d\ } \square_{n+1}{}^{\mathtt{L}} \xleftarrow{\ d\ } \square_{n}{}^{\mathtt{L}} \xleftarrow{\ d\ } \square_{1}{}^{\mathtt{L}} \xleftarrow{\ d\ } \square_{0}{}^{\mathtt{L}} \xleftarrow[\text{res}]{\text{inj}} \square_{\mathtt{L}} \\[4pt] \blacksquare_{\mathtt{L}}^{n} = \blacksquare_{k}{}^{\mathtt{L}} = \overbrace{\boxbslash_{n}{}^{\mathtt{L}}} \ulcorner \overbrace{\boxslash_{n}{}^{\mathtt{L}}} \end{cases}$$

$$\mathtt{1}\lhd_{\square} \text{ left contra } \begin{cases} \cdots \xleftarrow{\ \partial\ } \mathtt{1}\lhd_{n+1}{}^{\mathtt{L}} \xleftarrow{\ \partial\ } \mathtt{1}\lhd_{n}{}^{\mathtt{L}} \xleftarrow{\ \partial\ } \mathtt{1}\lhd_{1}{}^{\mathtt{L}} \xleftarrow{\ \partial\ } \mathtt{1}\lhd_{0}{}^{\mathtt{L}} \xleftarrow[\text{res}]{\text{inj}} \mathtt{1}\lhd^{\mathtt{L}} \\[4pt] \mathtt{1}\blacktriangleleft_{\mathtt{L}} = \mathtt{1}\blacktriangleleft_{n}{}^{\mathtt{L}} = \mathtt{1}\lhd_{n}{}^{\mathtt{L}} \ulcorner \overbrace{\mathtt{1}\lhd_{n}{}^{\mathtt{L}}} \end{cases}$$