

Claim: This is homotopy invariant and balanced:

*) $n=3$: hom invar: $X_i \xrightarrow{\cong} \bar{X}_i, A_i \xrightarrow{\cong} \bar{A}_i$ compatible maps which are homotopy equiv.

$$\Rightarrow E_{A_1} \times_{A_2} E_{A_3} \xrightarrow{\cong} \bar{E}_{\bar{A}_1} \times_{\bar{A}_2} \bar{E}_{\bar{A}_3}$$

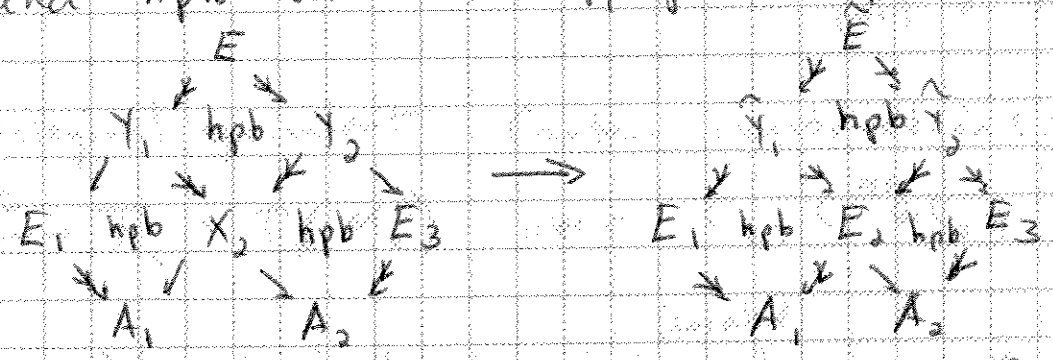
*) $n=3, r=2$: balanced:

$$E_{A_1} \times_{A_2} X_{A_3} \xrightarrow{\cong} E_{A_1} \times_{A_2} E_{A_3}$$

*) is an exercise in homotopy pullback squares

*) Write \rightarrow for a fibration and hpb for a homotopy pullback square

Consider



$$X_j \xrightarrow{\cong} E_j \Rightarrow Y_j \rightarrow \hat{Y}_j, j=1,2 \Rightarrow E \xrightarrow{\cong} \hat{E} //$$

Iterated homologically invariant cotensor product of differential comodules (= analogue of an iterated homotopy pullback)!