Two n-fold extensions are equivalent if there is a map of n-fold extensions

$$\begin{array}{ccccccccccc} 0 & \to & M' & \to & M_{n-1} & \to & \cdots & \to & M_0 & \to & M & \to & 0 \\ & & \| & & \downarrow & & & & \downarrow & & \| & & \\ 0 & \to & M' & \to & M'_{n-1} & \to & \cdots & \to & M'_0 & \to & M & \to & 0. \end{array}$$

To make this relation an equivalent relation, we need to do more work. For details, see Homology by S. MacLane P82 ~ P90. In Theorem 6.4 he showed

$Ext^n(C, A) \cong$ Set of all "congruence" classes $\alpha =$ cls S of n-fold exact sequence S starting A and ending at C. Let's stop here on the Yoneda pairing.

$0 \to M' \to M_{n-1} \to \cdots \to M_0 \to M \to 0 \quad 0 \to N \to N_{m-1} \to \cdots \to N_0 \to M' \to 0$

$0 \to N \to N_{m-1} \to \cdots N_0 \to M_{n-1} \to \cdots \to M_0 \to M \to 0$ Yoneda pairing

2. Applying the propagation principle; if $\mathcal{F}, \mathcal{G}, \mathcal{H}$ are coherent sheaves on M, then there is

$$\underline{Ext}^p_{\mathcal{O}}(\mathcal{F}, \mathcal{G}) \otimes_{\mathcal{O}} \underline{Ext}^q_{\mathcal{O}}(\mathcal{G}, \mathcal{H}) \to \underline{Ext}^{p+q}_{\mathcal{O}}(\mathcal{F}, \mathcal{H})$$

inducing the previous pairing in each stalk.

Γ Why do we need the propagation principle here?
Suppose we have $\mathcal{F}, \mathcal{G}$.
Consider. $\bigcup_{x \in M} Ext^p(\mathcal{F}_x, \mathcal{G}_x) = K$.

$\Rightarrow$ To K be a sheaf, we need the following condition, according to Hartshorne's Algebraic Geometry P60

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