Exercise 1. Let C be any curve. Show that the degree map $\mathcal{Z}^1(C) \to \mathbb{Z}$ which is defined by $\sum n_i Z_i \mapsto \sum n_i$ induces an isomorphism $\mathcal{Z}^1(C)/\mathcal{Z}^1_{alg}(C) \cong \mathbb{Z}$.

Recall that we defined classical motives using integral coefficients (Scholl uses rational coefficients). So for us

$$hom_{\mathcal{M}}((X,p,m),(Y,q,n)) = q \circ C_{rat}^{n-m+\dim X}(X \times Y) \circ p$$

(whereas Scholl uses $q \circ (C_{rat}^{n-m+\dim X}(X \times Y) \otimes \mathbb{Q}) \circ p$).

Exercise 2. Show that $CH^m(Y) = \hom_{\mathcal{M}}((\mathrm{Spec}(k), \mathrm{id}, -m), (Y, \mathrm{id}, 0))$.

Exercise 3. Show that an adequate equivalence relation $\sim$ for smooth projective varieties which is coarser than rational equivalence is the same thing as a collection of morphisms in $\mathcal{M}$ closed under composition and addition.

Exercise 4. Recall that a pairing $\phi : M \times N \to L$ of abelian groups is *non-degenerate* if for all $m \in M$ and $n \in N$ the induced maps $\phi(m,-) : N \to L$ and $\phi(-,n) : M \to L$ are injective.

Show that numerical equivalence is the finest equivalence relation which makes the pairing $CH^i(X) \times CH^{\dim X - i}(X) \to CH^{\dim X}(X)$ non-degenerate.