Exercises on correspondences

(1) Prove $\Delta_* = id$

(2) Prove $\Gamma_{f*} = f_*$

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(3) Prove that $L : H^k(X) \to H^{k+2}(X)$ is an algebraic correspondence

(4) What does the Hodge index thm say for $H^{2,2}(X, \mathbb{Q})$, when X is a surface?

(5) Compute the ring structure of $H^*(\mathbb{P}^N \times \mathbb{P}^N, \mathbb{Q})$, where the multiplication is given by composition of correspondences and not by the usual cup product.