Technical Preparation

1 Negativity Lemma

Theorem 1. Let $f : Y \to X$ be a proper birational morphism between normal varieties. Let D be a $\mathbb{Q}$-Cartier $\mathbb{Q}$-divisor on Y such that $-D$ is f-nef. Then D is effective if and only if f_*D is.

Proof. Yang: To be completed. □

2 General adjunction formula

Theorem 2. Let X be a normal variety and S be a reduced divisor on X. Let $f : Y \to X$ be a log resolution of (X, S). Write $K_Y + S' = f^*(K_X + S) + E$, where S' is the strict transform of S and E is exceptional. Then $f_*\mathcal{O}_Y(\lceil E \rceil) \cong \mathcal{O}_X$. Yang: Need to check the statement.

Proof. Yang: To be completed. □