

Theorem 10.31

$$I(X; Y) \geq 0,$$

with equality if and only if X is independent of Y .

Corollary 10.32

$$I(X; Y|T) \geq 0,$$

with equality if and only if X is independent of Y conditioning on T .

Corollary 10.33 (Conditioning Does Not Increase Differential Entropy)

$$h(X|Y) \leq h(X)$$

with equality if and only if X and Y are independent.

Remarks For continuous r.v.'s,

1. $h(X), h(X|Y) \geq 0$ **DO NOT** generally hold;
2. $I(X; Y), I(X; Y|Z) \geq 0$ always hold.