Witness

$\phi = (x \vee y \vee z)(\bar{x} \vee \bar{y})(x \vee \bar{z})$ <- Conjuntive normal form

$\phi \in SAT \equiv \phi$ has a satisfying truth assignment

Witness is a truth statement.

If it's satisfiable, there has to be a witness.

$\phi \in Co - Sat \equiv \phi$ has no satisfying assignment iff $\phi \in SAT$.

NP-Completeness

L is NP-complete $\equiv$ L is in NP and L is NP-hard.

NP $\equiv \exists$ witness

CoNP $\equiv \forall$ witnesses

$\exists x \forall y$ verifyable in poly time $\equiv \sum_z$

$\forall x \exists y = \Pi_z$

Proofing

You can do a transfer proof, by showing that a NP-foo problem can be transformed into whatever problem, thus it must have an lower limit of NP-foo.

True Quantified Boolean Formulas

$\forall x \exists y \forall z (x \vee y \vee z)(\bar{x} \vee \bar{y})$

Approximation Algorithms

You can make an approximation to an NP problem in P time. This can have provable performance limits. Heuristics however, don't have any guarantees.

An algorithm A is a ρ-approximation algorithm if for every input I with optimal solution value $OPT(I)$.