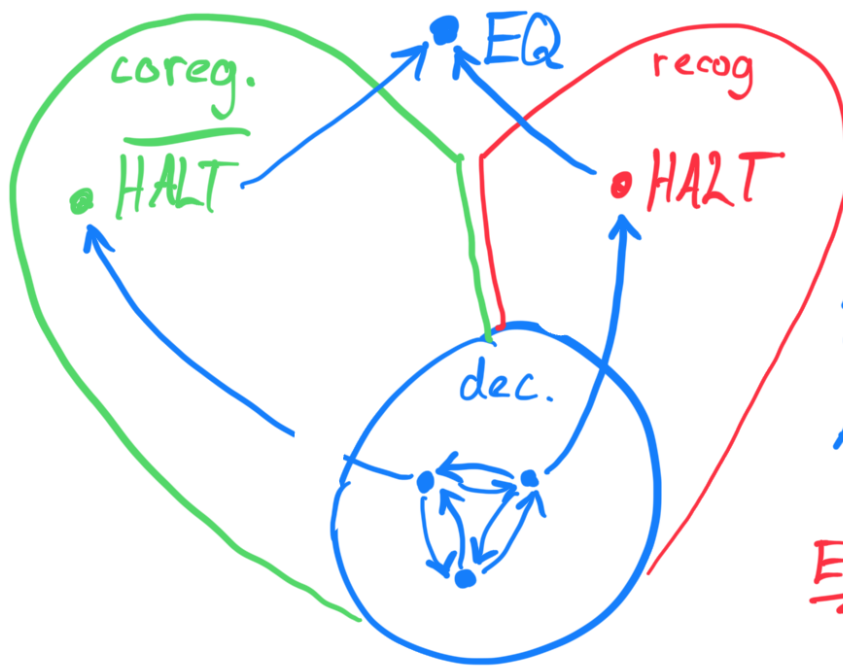




$$\overline{A_{TM}} \leq EQ$$

$$A_{TM} \leq EQ$$

$$A \rightarrow B$$

$$A \leq_m B$$

$$\overline{EQ} \cup \overline{\overline{EQ}} = \{0,1\}^n$$

Claim: $A \text{ dec} \Rightarrow A \leq_m B$ For any $B \neq \emptyset$
 $B \neq \{0,1\}^n$

Proof: $f(x) = \begin{cases} y, & x \in A \\ y', & x \notin A \end{cases}$ Fix $y \in B, y' \in \overline{B}$

Claim: $A \text{ dec} \Rightarrow \text{HALT} \not\leq_m A$
 $\text{HALT} \leq_m A \Rightarrow A \text{ undec}$

Def $A \text{ co-recog} \Leftrightarrow \overline{A} \text{ is recog}$

Claim: $\overline{\text{HALT}} \not\leq_m \text{HALT}$

$NR = \{ \langle M, w \rangle : M \text{ doesn't reject } w \}$

$L_3 = \{ \langle M \rangle : M \text{ halts on all inputs} \}$

$$NK \leq_m L_3$$

Want $F(\langle M, w \rangle) = \langle M' \rangle$

- M loop or acc $w \Rightarrow M'$ halt on all inputs
- M reject $w \Rightarrow M'$ loop on some input

M' on input $i \in \mathbb{N}$

- Run M on w for i steps

$\begin{cases} \rightarrow \text{if } M \text{ reject: loop} \\ \rightarrow \text{if } M \text{ accepts: halt} \\ \rightarrow \text{if } M \text{ doesn't halt: halt} \\ \quad (\text{in } i \text{ steps}) \end{cases}$