Post Thm Pf

Details for M in ⟸

$M :=$ On input w

1. For $i = 1, 2, 3, \ldots$
   2. Run E_1 & E_2 for i steps
   3. For each string x enumerated by E_i
   4. Check if $w = x$
   5. If yes & $i = 1$ then accept
   6. If yes & $i = 2$ then reject.

__Thm__ $\Sigma, \Gamma \neq \phi$, $L_1 \subseteq \Sigma^*$, $L_2 \subseteq \Gamma^*$

$L_1 \leq_m L_2$, if L_2 is CE then L_1 is CE.

__Pf__ L_2 is CE $\Rightarrow L_2$ is Turing recognizable

∴ $\exists$ TM M_2 s.t. $L(M_2) = L_2$.

AND $L_1 \leq_m L_2$ ∴ $\exists$ mapping reduction f which is comp.

Design M_1 s.t. $L(M_1) = L_1$ as follows:

   $M_1 :=$ On input x
   1. Compute $f(x)$
   2. Run M_2 on $f(x)$
   3. If M_2 accepts $f(x)$ then accept

$x \in L(M_1) \iff$ if-then-else on 3. evaluates to true

$\qquad \iff M_2$ accepts $f(x)$

$\qquad \iff f(x) \in L(M_2) = L_2$

$\qquad \iff x \in L_1 \quad$ (by f).