M computes f if $\forall w \in \Sigma_0^*$
$M(w) = f(w)$

$\triangleright \sqcup F(w) \rightarrow$ machine halts

Read first 12 min from slides or lecture

Let $M = (K, \Sigma, \delta, s, \{h\})$ be a TM,

$\Sigma 0$ subset of $(\Sigma - \{\sqcup, \triangleright\})$ be an alphabet

And let L is subset of Σ_0^*

We say that M *semidecides* L if for any $w \epsilon \Sigma_0^*$

if and only if M halts on input w.

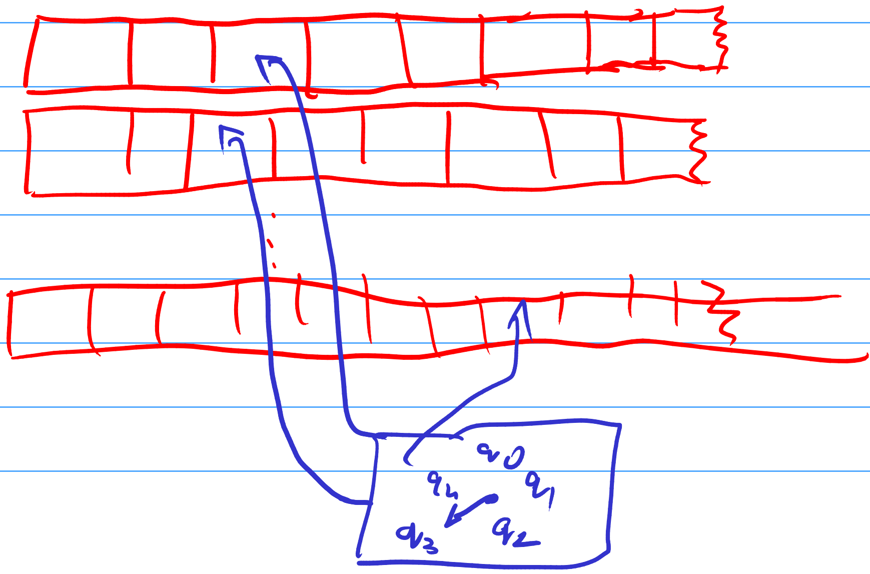
A language L is *recursively enumerable* if and only if there is a TM M that semidecides L.

If a L is recursive, then it is also recursively enumerable.

If a L is recursive, then it is complement is also.

Two tape turing machines

One step, read ALL heads



$(q_0, a) \to (q, \to)$

$(K \times \Sigma) \to (K \times \Sigma \cup \{\leftarrow, \to, \sqcup\})$

$\rhd \sqcup w \sqcup$ $\underline{\text{becomes}}$ $\rhd \sqcup w \sqcup w \underline{\sqcup}$

$\rhd \sqcup bba \sqcup \sqcup$

Tape1 $\rhd \sqcup bba \sqcup \sqcup$ $\to$ $\rhd\ bba \sqcup bba\ \underline{\sqcup}$

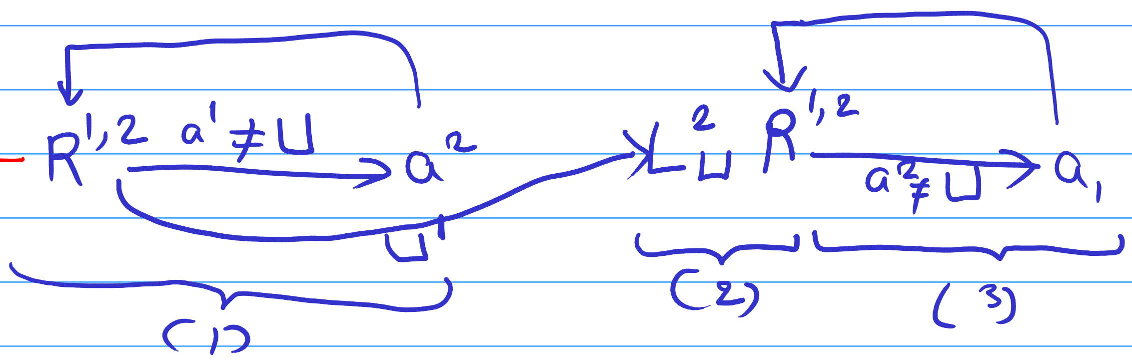
Tape2 $\rhd \sqcup$

Tape1 $\rhd \sqcup bba \sqcup \sqcup$

Tape2 $\rhd \sqcup bba \sqcup$

T1 $\rhd \sqcup bba \sqcup \sqcup$ $\to$ T1 $\rhd \sqcup bba \sqcup bba \sqcup$

T2 $\rhd \sqcup bba \sqcup$ T2



$R^{1,2}$ (move right once on 1 & 2)

$L^2_\sqcup$ (move here, 2 left all the way back)