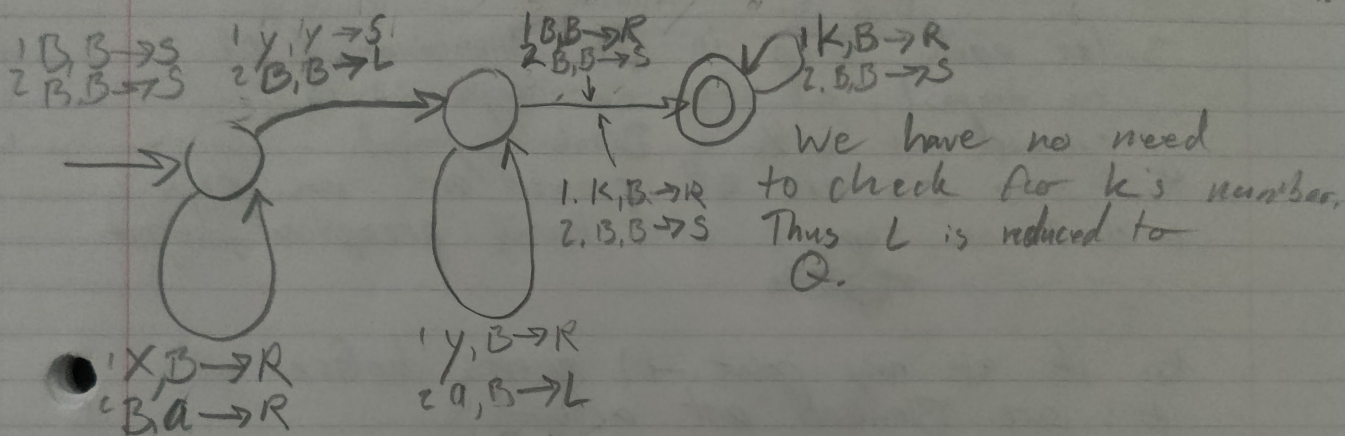


Berra CS 252 HW 8 Bearroom

1. Consider TM X where Tape 1 holds the input string from L .
Tape 2 is empty and will hold a equivalent string a .



2. Let $B = \{ \langle M \rangle \mid M \text{ is a single Tape TM that writes a Blank symbol over a nonblank symbol when run on input } w \}$

Consider The ATM problem is reduced to B .
Assume there is a TM X that decides B .
We will use TM X to decide ATM in a machine TM Y .

- $Y =$ on input $\langle M, w \rangle$
- Using M , and w make a TM F that simulates M if accepts w writes a Blank symbol on the first nonblank symbol.
 - Run X on F . X will check if the string w , and $TM F$ are different lengths.
 - If X accepts, accept else reject! Contradiction! undecidable!

3. TM R is a decider for L .
it works by:

1. R simulating M on tape 1.
2. Tape 2 has the # of steps, t .
3. for each step in the simulation of M on tape 1, a step on tape 2 is crossed out with a Blank symbol.
4. if the t 's are all crossed out on tape 2 and M on tape 1 still hasn't accepted, reject.
~~reject~~
5. if at any point M accepts before all t 's are Blanked out accept.