

Section 4.2: The most important:

- # algorithms is countable, hence \exists languages not recognized by any T.M.

- $A_{TM} = \{ \langle M, w \rangle \mid M \text{ accepts } w \}$ is undecidable (but recognizable)

- $\overline{A_{TM}}$ is unrecognizable

§ 3.1 - TMs ✓

§ 3.2 - Variants

{ multi-type ✓
non-deterministic
[not yet]

§ 3.3 - Just believe that T.M.s are a good notion or an algorithm

Do this

§ 4.1 - Some decidable "acceptance problems"
Warm up for

Technicalities:

- " $\langle \rangle$ " angle brackets \leftrightarrow "description of"
(with no sneaky stuff)

- Universal Turing Machine

- Then everything else is quick.

§4.1: Warmup: $A_{DFA} = \{ \langle M, w \rangle \mid M \text{ accepts } w \}$ (4)

is decidable, i.e. there is a T.M. that can take
32#5#...#20###143...2 and always stop in
 q_{acc} , q_{rej} , i.e. always halts, $\begin{cases} q_{acc} \text{ then } M \text{ accepts } w \\ q_{rej} \text{ " " " rejects } w \end{cases}$

§4.1 A_{DFA} is decidable

§4.2 A_{TM} is recognizable by an "interpreter" or
"universal TM"