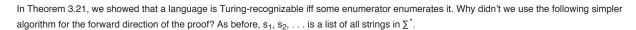
## **Problem**



E = "Ignore the input.

- **1.** Repeat the following for  $i = 1, 2, 3, \ldots$
- 2. RunM on s<sub>i</sub>.
- 3. If it accepts, print out si."

THEOREM 3.21

A language is Turing-recognizable if and only if some enumerator enumerates it.

## Step-by-step solution

## Step 1 of 1

**Theorem: -** A language is Turing – recognizable if and only if some enumerator enumerates it.

The given simpler algorithm for the forward direction of the proof of this theorem is

Say that  $S_1, S_2$  is a list of all strings in  $\Sigma^*$ 

If Turing Machine M recognizes a language L, then we can construct following enumerator E for L.

The Enumerator E works as follows:

E = "Ignore the input

- 1. Repeat the following for i=1,2,3,...
- 2. Run M on S<sub>i</sub>;
- 3. If it accepts, print out  $S_{i}$  "

## Defects in this proof:

In stage 2 of this algorithm (Run M on  $S_i$ )

If M loops on a certain input  $S_i$  runs forever, E could not check any input after  $S_i$ .

If it occurs, then E might fail to enumerate its language L as required.

Thus this procedure does not give the effect of running M in parallel on all possible input strings.

So, this proof is not suited for forward direction of above theorem.

Comment