

• Before looking at more examples
(more algorithms, as Turing machines),
we will learn some concepts
related to computation in general.

• A YES or NO problem

(like the one we saw in the example)
can be thought of as a 'language'.

• A 'language' of strings.

• For $0^n 1^n$ ($n \geq 1$), 01 is in the language.

i.e., $01 \in L$, $0010 \notin L$. L is a set of
strings, that gives YES answer.

(SUDEEP)

(28)

Examples:

1. Qn: Is the string of even length?

Language: $\{00, \epsilon, 0000, \dots\}$

2. $A = \{0^{2^n} \mid n \geq 0\}$, i.e., 2^n zeroes.

Qn: Is the string length a power of 2?

3. Is the given number prime?

Set of prime numbers.

- A machine 'decides' a language means
it says YES if input $w \in L$
says NO if $w \notin L$
- Machine 'recognizes' a language:
It says YES if input $\in L$
and does not say YES if input is not in L

'Language of strings of even length:
can be checked using states alone,
reading the input symbols only once.
ie., it can be done using a
'finite automata'.

'A turing machine can do much more!

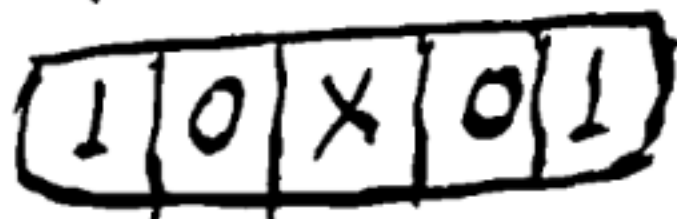
- What explains 'where is the Turing machine' (or computation) right now:
 - State
 - Current contents on the tape
 - Which is the 'current cell'.
- Called the 'configuration' or instantaneous description of a TM.

$C_1: q_0 1101:$



state: q_0

$C_1: 10q_1X01:$



q_1

If there is a move

$$\delta(q_1, X) = (q_2, 0, L)$$

The 'next' config is



q_2