TM algorithms

1. formal description
2. implementation
3. high level

Object $O$ on input
- polynomial
- graph
- grammar

$\langle O \rangle$ - encoding of $O$ on the input.
$A = \{ <G> \mid G \text{ is a connected undirected graph} \}$

Diagram:
- $a$ connected to $b$ via edge $(a, b) = (b, a)$
- $a$ connected to $d$ via edge $(a, d)$
- $b$ connected to $c$ via edge $(b, c)$
- $c$ connected to $b$ via edge $(b, c)$
Machine $M$ decides $A$.
(high level)

$M = \text{On input } \langle G \rangle$

1. Select the 1st node and mark it.
2. Repeat step 3 until no new nodes are marked.
3. For each unmarked node in $G$ mark it if it is attached to by an edge to another marked node.
4. Scan all nodes of $G$
   If they are all marked, accept.
   Otherwise, reject.

Implementation Level:

$\langle G \rangle = \left( \text{nodes} \right) \left( \left( \right) \ldots \left( \right) \right)$

\[ \text{edges} \]

\[ \begin{array}{c}
\text{1} \\
\text{2} \\
\text{3} \\
\text{4}
\end{array} \]

\[ \begin{array}{c}
\left( \left( 1, 2, 3, 4 \right), \left( 1, 2 \right), \left( 1, 3 \right), \left( 1, 4 \right), \\
\left( 2, 3 \right) \right)
\end{array} \]

Step 1: mark node w/ x
\[ 1 \rightarrow 1 \quad 2 \rightarrow 3 \]

Step 2/3: * newly marked nodes
- previously marked node

Formal description.
recognizable

decidable

CFL

reg
\[ L = \{ww \mid w \in \Sigma^*\} \] - not context-free

TM. M recognizes L: - not regular

M = On input s
1. Find the middle?
   - work from the ends
     
     \[ XXXXXXXX \]

   OR = non-det test for middle

2. insert #