

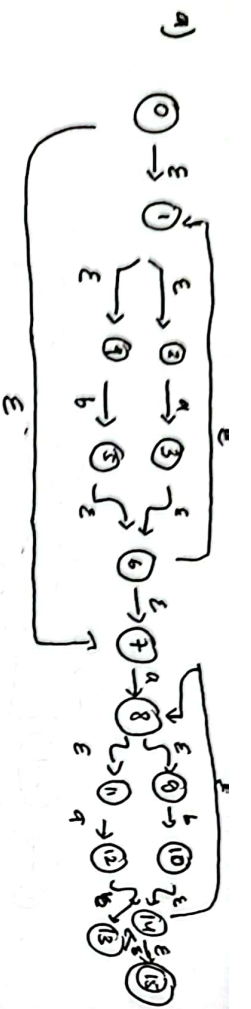
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$$Z = \{5, 9\}$$
$$Z = \{z_1, z_2, z_3\}$$
$$y = 5.59$$
$$S = \{2, 4, 6, 7\}$$
$$E = \{c, 17, 3\}$$
$$x = \{83\}$$
$$I = 2.9$$
$$f_{\text{instpos}} = \{x^y\}$$
$$\text{lastpos} = \text{lastpos} + 1$$

The diagram illustrates the state transitions for a Turing machine. The states and their transitions are as follows:

- State 1** (Start state, double border): Transitions to State 2 on input 'x'.
- State 2** (Circle with 2, 4): Transitions to State 3 on input 'x' and to State 5 on input 'y'.
- State 3** (Circle with 3): Transitions to State 5 on input 'y'.
- State 5** (Circle with 5): Transitions to State 4 on input 'x' and to State 8 on input 'y'.
- State 4** (Circle with 2, 4, 6, 7): Transitions to State 8 on input 'x' and to State 8 on input 'y'.
- State 8** (Final state, double border): Transitions to State 6 on input 'x' and to State 8 on input 'y' (self-loop).
- State 6** (Circle with 6, 7): Transitions to State 8 on input 'x' and to State 8 on input 'y'.
- State 7** (Circle with 3, 6, 7): Transitions to State 8 on input 'x' and to State 8 on input 'y'.
- State 8** (Circle with 5, 8): Transitions to State 4 on input 'x' and to State 8 on input 'y'.

state	x	y
$\{1\}$	$\{2, 4\}$	$\emptyset$
$\{2, 4\}$	$\{5\}$	$\{5\}$
$\{3\}$	$\emptyset$	$\{2, 4, 6, 7\}$
$\{2, 4, 6, 7\}$	$\{3, 6, 7\}$	$\{5, 8\}$
$\{3, 6, 7\}$	$\{2, 4, 6, 7\}$	$\emptyset$
$\{5, 8\}$	$\{6, 7\}$	$\{8\}$
$\{1, 4, 7, 8\}$	$\{3, 6, 7\}$	$\{5, 8\}$
$\{8\}$	$\emptyset$	$\emptyset$



$\epsilon$ -NFA

Node	Close Result
0	$\{0, 1, 2, 4, 7\}$
1	$\{1, 2, 4\}$
2	$\{2\}$
3	$\{1, 2, 3, 4, 7\}$
4	$\{4\}$
5	$\{1, 2, 4, 5, 6, 7\}$
6	$\{1, 2, 4, 6, 7\}$
7	$\{7\}$
8	$\{8, 9, 11\}$
9	$\{9\}$
10	$\{8, 9, 10, 11, 14, 15\}$
11	$\{11\}$
12	$\{12\}$
13	$\{8, 9, 11, 13, 14, 15\}$
14	$\{8, 9, 11, 14\}$
15	$\{15\}$

Start =  $E_{00} = \{0, 1, 2, 4, 7\}$

1a.  $\delta(E_{00}, a) = \{3, 8\} = \{1, 2, 3, 4, 6, 7, 8, 9, 11\}$

1b.  $\delta(E_{00}, b) = \{5\} = \{1, 2, 4, 5, 6, 7\}$

2a.  $\delta(E_{\{3, 8\}}, a) = \{3, 8, 12\} = \{1, 2, 4, 6, 7, 8, 9, 11, 12\}$

2b.  $\delta(E_{\{3, 8\}}, b) = \{5, 10\} = \{1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15\}$

3a.  $\delta(E_{\{5\}}, a) = \{3, 8\}$

3b.  $\delta(E_{\{5\}}, b) = \{5\}$

4a.  $\delta(E_{\{3, 8, 12\}}, a) = \{3, 8, 12\}$

4b.  $\delta(E_{\{3, 8, 12\}}, b) = \{5, 10, 13\} = \{1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15\}$

5a.  $\delta(E_{\{5, 10, 13\}}, a) = \{3, 8, 12\}$

5b.  $\delta(E_{\{5, 10, 13\}}, b) = \{5, 10\}$

6a.  $\delta(E_{\{5, 10, 13\}}, a) = \{3, 8, 12\}$

6b.  $\delta(E_{\{5, 10, 13\}}, b) = \{5, 10\}$

DFA

