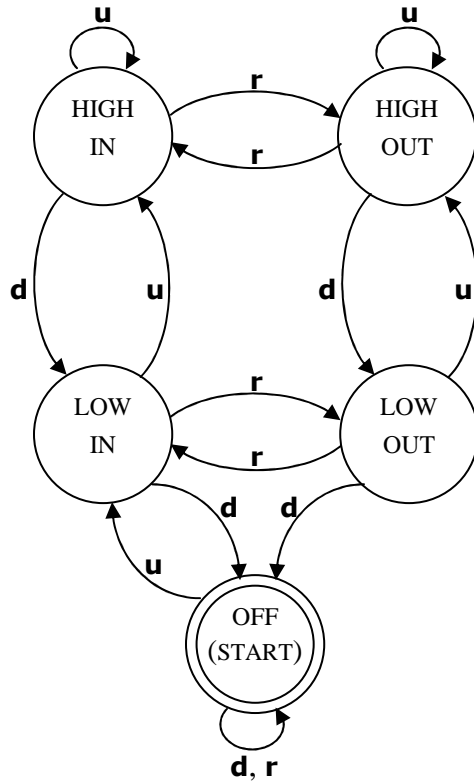


## LING 106: Homework 4

### 1. DEVISING A FINITE STATE AUTOMATON



Some length-6 strings the machine recognizes:

- **up down up down up down (ududud)**
- **up up reverse down reverse down (uurdrd)**
- **up up up up down down (uuuudd)**
- **reverse reverse reverse reverse reverse reverse (rrrrrr)**
- etc.

## 2. FORMAL DESCRIPTION OF AN FSA

1.  $Q = \{A, B, C, D\}$
2.  $\Sigma = \{\bullet, -\}$
3.  $\delta =$ 

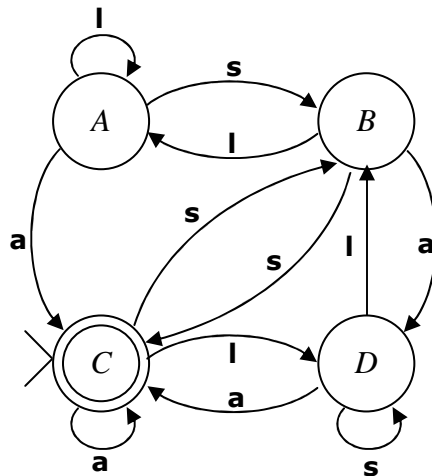
	$\bullet$	$-$
$A$	$A$	$C$
$B$	$C$	$A$
$C$	$D$	$B$
$D$	$D$	$A$
4.  $s = A$
5.  $F = \{A, D\}$

Which of the following strings does  $M_1$  accept? (\* = "does not accept")

- a. \*  $\bullet \bullet - -$
- b.  $\epsilon$
- c.  $\bullet - \bullet - \bullet$
- d.  $\bullet \bullet \bullet - - - \bullet \bullet \bullet$
- e. \*  $\bullet -$
- f.  $- \bullet \bullet$
- g. \*  $- \bullet - - - \bullet - \bullet$
- h.  $\bullet \bullet \bullet$
- i. \*  $- - - -$
- j.  $\bullet - \bullet \bullet \bullet$

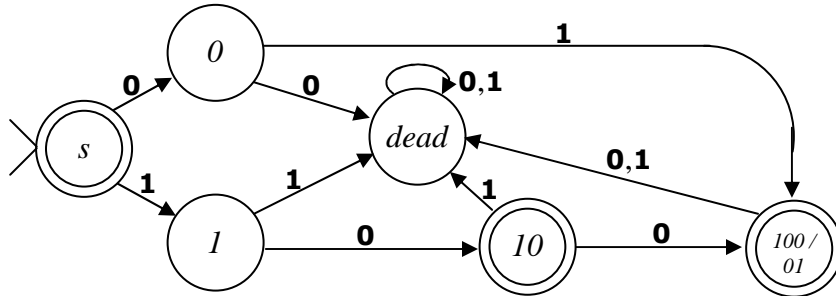
## 3. DIAGRAM OF AN FSA

- a.  $\epsilon$
- b. \*  $l$
- c. **llsss**
- d. **salsa**
- e. \* **al**
- f. **aaaa**
- g. **asllaaaa**
- h. **ssssss**
- i. \* **lslls**
- j. \* **sassla**

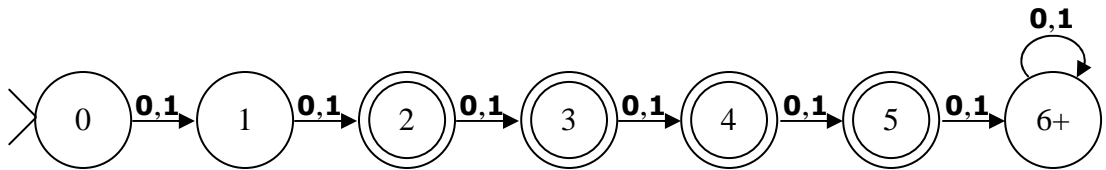


## 4. REGULAR LANGUAGES

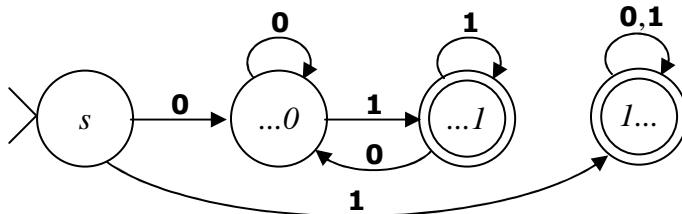
a.  $\{\epsilon, 01, 10, 100\}$



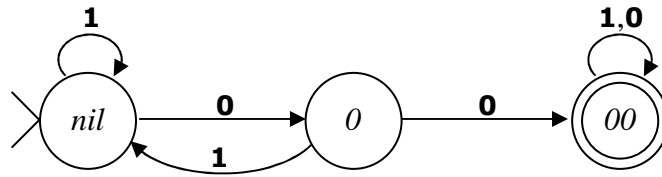
b.  $\{s \mid \text{the length of } s \text{ is between 2 and 5, inclusive}\}$



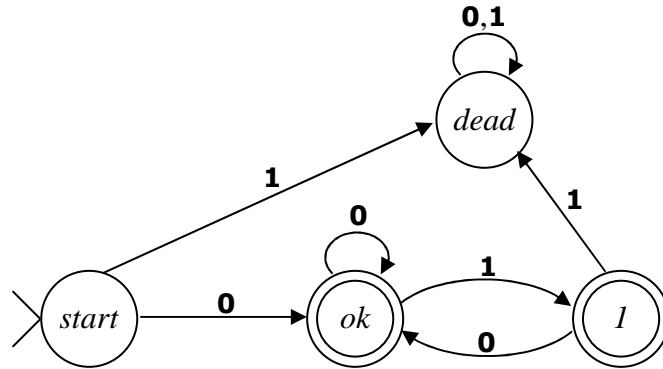
c.  $\{s \mid s \text{ starts with } 1, \text{ or ends with } 1, \text{ or both}\}$



d.  $\{s \mid s \text{ contains the substring } \mathbf{00}\}$



e.  $\{s \mid s \text{ starts with } \mathbf{0} \text{ and does not contain the substring } \mathbf{11}\}$



f.  $\{s \mid \text{every instance of } \mathbf{10} \text{ in } s \text{ is immediately followed by an instance } \mathbf{01}\}$

