

# طراحی کاپایلرها

نیم سال اول ۰۳-۰۲



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تمرین اول

## پاسخ مسئله‌ی ۱.

acccbabbbaacacaabaabbabc

$$Q = (a + b)c* : a b$$

$$R = a*b+ : b+$$

$$S = a(ca)*bc* : ab$$

Q: accc R:b R:abbb Q:ac Q:ac Q:a S:ab R:aabb S:abc

a, c, c, c, b, a, b, b, a, c, a, c, a, a, b, b, a, b, c

## پاسخ مسئله‌ی ۲.

A)

$1\text{sigma}^*010\text{sigma}^* - \text{sigm}^*01010\text{sigma}^*$

B)

To expand the language formula  $\{\Sigma = \{0, 1, 2\}\}$  by adding a new character called '2' to the alphabet and expanding the alphabet L, you can do as follows:

$L' = L + \{2\}$

Therefore, the new alphabet L' is equal to  $\{\Sigma = \{0, 1, 2\}\}$  and the desired language can be defined as follows:

$L' = \{w \mid w \text{ is a string containing a combination of zeros, ones, and twos}\}$

### پاسخ مسئله‌ی ۳.

1. a) grammar:

$S \rightarrow aA$

$A \rightarrow bA \mid \text{epsilon}$

string:

$b^*ab^* + \text{sigma}^*(a^*ba^*ba^*) + \text{sigma}^*$

Produces the output of strings that end with a and do not contain the string bb.

b) grammar:

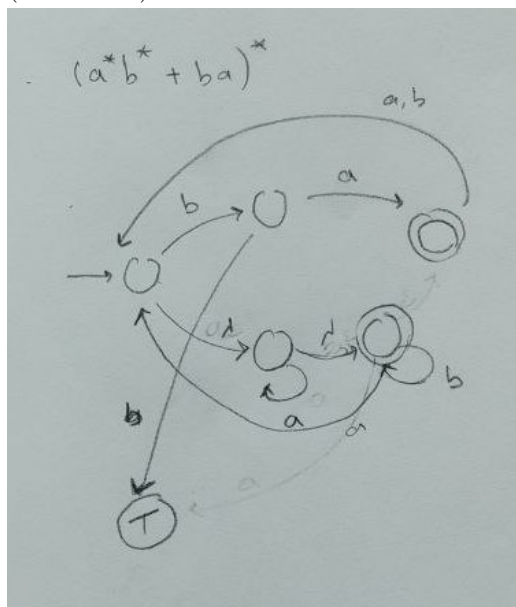
$S \rightarrow bbS \mid aaS \mid aSa \mid bSb \mid \text{epsilon}$

string:

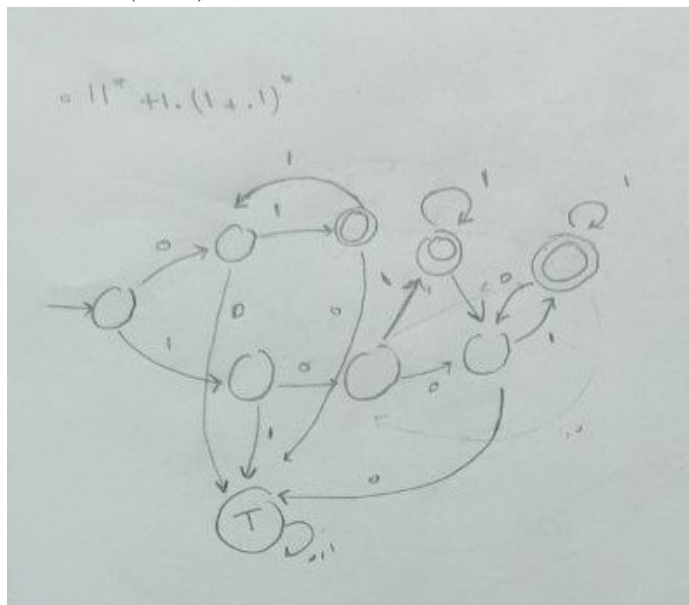
$(ba+b)^*$

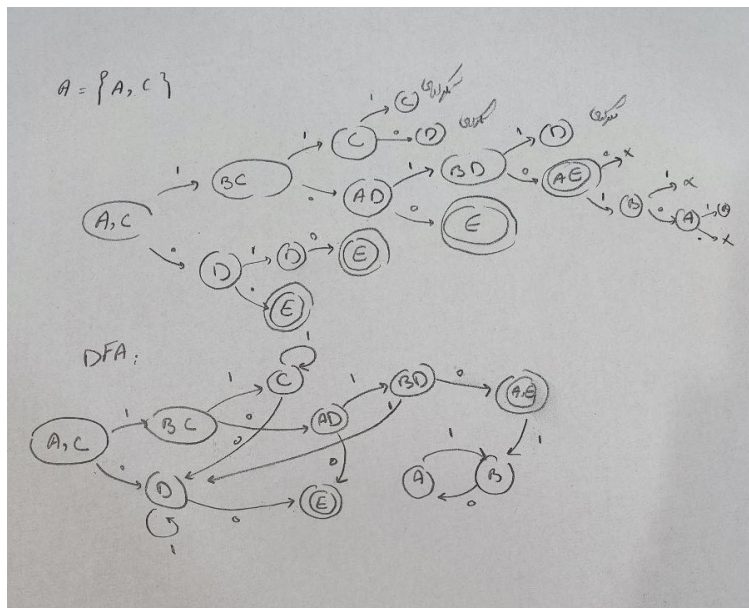
Produces strings with at least two b's or two a's.

2. ( )  $(a^*b^* + ba)^*$



( )  $011^* + 10(1+01)^*$





3. ( ) dfa  
( )  $(10)^*1^*01^*0$

## پاسخ مسئله‌ی ۴.

Right-Most:

```

E → [E]
[E] → [U V]
[U V] → [><V]
[><V] → [><a]
[><a] → [<a>]
[<a>] → [a]
E → [a]
[a] → [a]@[E]
[a]@[E] → [a]@[B E]
[a]@[B E] → [a]@[! E]
[a]@[! E] → [a]@[! V]
[a]@[! V] → [a]@[! a]
[a]@[! a] → [a]@[b!a]

```

Left-Most:

```

E → [E]
E → [E]@[E]
[E] → [E]B
[E]B → [E]!
[E]! → [E]V
[E]V → [E]a
[E]a → b!a
[a]@[E] → [a]@[b!a]

```

Parse tree:

```

      E
      /
     [ ]
    / \
   U  V
  /
 < a
 / \
@ E
 / \
B E
 / \
! V
 \
 a

```