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# Theory of Automata

# Assignment # 01:-

No: 1  
descriptive

The language  $L$  of string of even length  
define over

$$Z = \{c\} \text{ written as } \underline{a}.$$
$$L = \{ \Lambda, cc, cccc, cccccc, cccccccc, \\ cccccccccc, cccccccccccc, cccccccccccc, \\ cccccccccccc, cccccccccccc, cccccccc \\ cccccccc, cccccccccccccccc, cccccccc \\ cccccccc, cccccccccccccccccccc, --- \}$$

No:2 descriptive

The language  $L$  of string that does not start with  $^n y^n$  define over

$$\Sigma = \{x, y, z, w\}.$$
$$L = \{ 1, n, z, w, wx, wz, wy, xw, \\ ny, nz, zw, zn, zy, wxy, wxz, \\ wxz, xyz, nyzw, znxy, } \}$$

### No: 3 descriptive

The language of string of length 2 define over  $\Sigma = \{0, 1, 2, 3, 4, 5\}$  written as.

$$L = \{00, 01, 11, 12, 21, 02, 20, 23, 24, 25, 30, 31, 32, 33, 34, 35, 40, 41, 42, 43, 44, 45, \dots\}$$

### No: 4 descriptive

The language of string with equal number of a's equal to the number of b's, defined over  $\Sigma = \{a, b\}$ .

$$L = \{1, ab, aabb, aaabbb, aaaabbbb, aaaaaabbbbbb, ba, abab, ababab, abababab, aaabbbabba, abbababba, abbaabba, aabbaabba, bbaabba, aabbaabba, bbaabba, \dots\}$$

No : 5  
descriptive

The language of  $a.b^n$  defined over

$$\Sigma = \{a, b\}.$$

$$L = \{ab, abb, abbb, abbbb, abbbbbb, \\ abbbbbbb, abbbbbbbb, abbbbbbbbbb, \\ abbbbbbbbbb, abbbbbbbbbb, abbbbbbbbbb, \\ abbbbbbbbbb, abbbbbbbbbb, abbbbbbbbbb, \\ abbbbbbbbbb, abbbbbbbbbb, abbbbbbbbbb, \dots\}$$

No : 6  
descriptive

The language of  $L$  of prime number defined over

$$\Sigma = \{0, 1, 2, 3, 4, 5, \dots\}$$

$$L = \{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, \\ 31, 37, 41, 43, 47, 53, 59, \\ 61, 67, \dots\}$$





$L = \{ ab, ac, ad, abc, abd, acd, abcd, acbd, acdb, adbc, adcd, adcb, adddbc, abcd e, abbccdd, acccddbb, \dots \}$

No: 9

description

The language of  $L$  with having same ending and starting letter defined over

$$\Sigma = \{ w, x, y, z \}$$

$L = \{ wnw, wnyw, wnyzw, wnxnyzw, xwx, xzx, xwyx, xwyzx, ywy, yny, yzy, ywny, ywnzy, ynxny, nyyn, ywy, yzy, yzzy, yzzy, yzyzy, yzyzy, \dots \}$

Alm. 2

No: 10

description

The language  $L$  of string which starts with a's with end with b's which is defined over

$$\Sigma = \{a, b\}.$$

$$L = \{ab, aab, aabb, abbab, ababb, aababb, aabbb, aaabbb, ababab, aaabbbab, aaabbbb, ababababab, abbabbabb, abbbabb, abbbbbb, ababbbb, abbaaaab, aaaaaaab, \dots\}.$$



No : 1

Recursive

- 1-  $\epsilon$  belong to this language
- 2- If  $n$  is in even then  $(n+2)(n-2)$  belong to  $L$
- 3- No other string except describe above are part of this language.

No : 2

Recursive

- 1-  $w, n, y, z$  belong to this language
- 2- If  $n$  is in  $L$  then  $sn$  is also in  $L$  where ' $s$ ' belong to  $L$
- 3- No other string except describe above are part of this language.

No : 3

Recursive

- 1-  $0, 1, 2, 3, 4, 5$  belong to this language

- 2- if  $s(n)$  and  $n=2$  then  $s$  belong to language
- 3- No other string except describe above are part of this language

No: 4

Recursive

- 1-  $ab$  belong to this language
- 2-  $s(a)(b)s$  are in  $L$  where  $s$  belong to  $L$
- 3- No other string except describe above are part of this language

No: 5

Recursive

- 1 -  $ab$  belong to this language
- 2 - if  $n$  is in  $\{a, b^n\}$  then  $axb$  is in  $\{a \cdot b^n\}$
- 3 - No other string except describe above are part of this language



No: 6

Recursive

- 1 - whole number belong to this language
- 2 - if  $n$  is in Prime then whole number belong to  $L$
- 3 - No other integer except constructed in above are allowed to be in prime.

No: 7

Recursive

- 1 -  $n, y$  are in language  $L$ .
- 2 -  $s( )$  to  $s$  are  $a.b$  in  $L$ , where  $s$  belong to  $L$ .
- 3 - No string except those constructed in above, are allowed to be  $L$ .

No: 8

Recursive

- 1 -  $a$  are in  $L$ .
- 2 -  $s(a)$  are also in  $L$  where  $s$  belong to  $\Sigma$
- 3 - No string except those constructed in above are allowed be in  $L$

No: 9

Recursive

- 1 -  $x, w, y, z$ , are in  $L$
- 2 -  $s(w)$  (a) and (b)  $s(b)$  are also in  $L$ , where  $s$  belong to  $\Sigma$
- 3 - No string except above are allowed in  $L$ .

bbaa, bbaa

No: 10

Recursive

- 1 -  $a, b$  are in language
- 2 -  $(a)(s(b))$  are in  $L$ , where  $s$  belong to  $\mathbb{Z}$
- 3 - No string except above are included in language.