

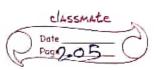
1		
1	02	Regular Expression & Regular language
\		Regular Expression (RE)
\	1	IN ALLIANDER BALLERY I I I I I I I
	patr	Let E be an alphabet which is used tas denote
		the input set.
	un	The regular expression over & can be defined
		as follows. Or engriphers
	1.	\$ is a regular Expression which denotes the
		empty set.
		4 Wester For the language on toining
	20	Elis a regular expression which denotes set
		16 f and it is null string a se bun
	3_	for each a in E'o' is a regular expression
	- 1	and denotes the set last training
	(1,0	- Inding with co ever the set I
1	۷,	1. Union > 8+S is equivalent to LIULZ.
	3.	E White RE ter the language accepting
		2. concatenation -> r.s. is equivalent LIL2.
		Land ending with o.
		3. closure > r* is equivalent to 1th
	br	n 1x 15 known as kleen closure or closure.
		which indicates broccurrence of reform
		number of times 2d to a the and
		1 retpiset nown tost positive closure
		ainte mans daideumi 13, Mulli - 3
		for if F = 101 RF = 0* then R= 1 &, a, aa, aaa
	bank or	Hotel de la sessimilation at other R= [a, aa, aaa]
		$a^* = \epsilon a^+$
1		



11			
		poling all	
	1	RE for the language accepting all	
		combination of a's	atidi
			20
5	2.	Write RE for the language accepting all	
D. Control	Jerakes	combinations of as Except	1120
1		- tapping the	
	1-11-3-	Write RE for ther language containing au	1
		the strings containing any number of	
0.	= 1	a's and b's missens troluper p a o 1	in.
		empty set	1
1	4	Write RE for the language containing	1
	7 7 7 2	all string having any number of als	10
1		and big a except the null string	
L			
1	△5.	econstruction the RE for the language 1 2	
Į.		ELECTION OF THE PROPERTY OF TH	
Ļ		ending with 00 over the	1
		ending with 00 over the set $\Sigma = (0,1)$	
	G. 1	drite RE for the land	
1		Land ending with a	
		- and ending with	-
	II.	The state of the s	
	eseco Jolu	orite Rentor the language mistating and	
	e	ending with a grange matering and	
	0	ombination of itand chaving tank	
	- 11	DETWOOD ON THE PARTY	
-	0. 14	brite printo	
	0° jr	er E = 19, b.c. in which	
		er & - 19, bic in which	<u> </u>
	mi wi	libe guch that any number	
	is	followed by pany number of his followed	
	by	any number of c's of his followed	

		Page 203
1		in the second se
	4.	write RE to denote a language L which
	and pa	is accepts all the string which begin
	20	or end with reither 00 or 11.
4		RE = [(00+11)-(0+1)*] + [(0+1)* (00+11)]
4		subject adjacer C. aspens
4	16	construction RE to for the of longuage L which
4		accepts all the strings with atteast two
1	fund	RE = (a+b)* b (a+b)* b (a+b*)
+		RE = (a+b)*b(a+b)*cb(a+b*)
+		Exactly two b's
+	10	17 Obtain RE anch that LCR3 = HITHY E12
+		REOVERDATE BOST BOST BOST OF TENED IN MICH
+	10	a a dante air is bound = 1 dialance 21
$\dagger$	.12	Even length of string &= 40191101 31
t	Tim	RE = L(00)7 2'n 70 roda un odt
t		ND - NEO ON SO TO TOO TOO TO TO TO
t	12-	odd+lengthness stringinstalist antil
1	1.0	1011 0 1010
1		RE =1(11)*
1		
1	14	write RE for the longuage 2 over the == Laibs
		in which total number of o's divisible bys
		RE = (b*ab*ab*ab*)*
		(D) (EB) (D) (D)
	15.	Write RE for the longuage & such that all the
		string do not contain the substring "ah"
		string do not contain the substring "ab"
		RE = { b*a*}

	classmate	
111.	Pag 9.01	
	(5-3)	
	Write RE for the following language.	
	of 0's of is but not having consecutive os	11.7
1i	The set of cell stoling of o's & I's such the	
	every pair of adjacent o's appears	
-	sion to this opping ant the attant	
	length of two (d+D) d * later = 19	
	obtain RE such that LCR) = h)   w = (0, N)	
<u> </u>	with at least three consecutive o'c	
18	write RE for this - College	
j.   -	the set of all the strings such that he number of o's is add	
jì -	The set of	
	contain 1101 the strings that do not	
	Pho -1(11)*	,,,
1000 J = 4	90 91 900 92	e- ()=
	in which total names of	1.
	10 0 d 0 +d 0 +d 0 1 39	
3-7+ 11/5	40 10 000000000000000000000000000000000	
"d	15. Write RE Lot contained the substitute of the State of	
	*D*d } - 3+	
		FILE



	Date Pag 9.05
	Ongress at the same of the sam
per int	1. Solve & Design DrA for positAres contains
	2. do not contains means complement of mic
	THE THE TOTAL OF THE REPORT OF THE THE REPORT OF THE REPORT OF THE REPORT OF THE REPORT OF THE REPOR
	8) complement - we will change final state to
0	non-final state and non final state to final state
	THEY TELL MINUTE SEE IS.
	find RE ower = = foils
	containing atleast 20's
1.	containing atleast 20's
	- 1 - 2 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9
2.	begin or end with 00 or 11
0	This is a ser moithle appiant of double
<u>ع</u> .	Both the numbers of o's and i's are even
20	Describe the language denoted by following
	regular expressioned to anotherine
	(1.86
	RE = (b* (900)*B+)*
21	Describe in simple English the language
0.==	represented mby thenfollowing Rot of
71 -41	= C(A) = RE= (a+ab)* (a+ab)*
11 -44	12000 - 1700 - 17000 - 17000
	in Calculater 11 such thecir
	3+ 1P. 116 = 10 Shots topts 2 10 71+
da	5. similarly committee the final strine int
	Himally - mine the At-

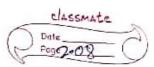
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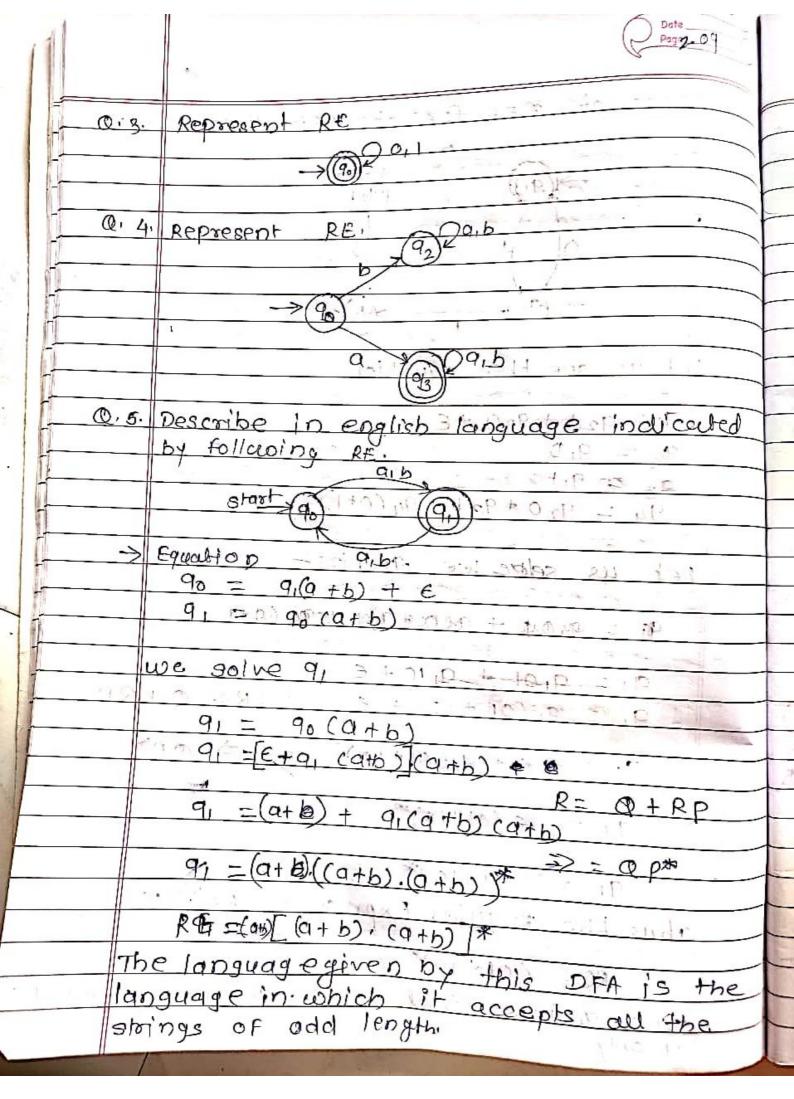


Date Par 20 06	2
Anders Theorem	
11	D9
The Ardens theorem is the equivalence of two regular expression as well as in conversion of DFA to RE.	
Let Pg o be the two regular rexpression	-
over the input set E.	
the Regular Expression Ris given as	
R=Q+RP Landing	
which as unique solution as P	
R= Op#   solding of diag.	
in the legalized depoted by following	
egalvaience of RE and DEADY roluga	N N
1. Let 9, be the initial (State one) *1 = 300	
The final state may be simber of state	ir,
some qui where ic=	bl
3. let di represents the tocinsition from 9; to	7,
4. Calculate 9; such that	
if 9; is start state 9; = 21.9; +6	
5. similarly compute the final state which	
ultimately gives the RE. State which	
	10 3

	A DEA
Q. 1.	Construct RE too the given DFA
	$\begin{array}{c c} & & & & & & & & & & & & & & & & & & &$
men e	let us build the Regular Expression for each
>	ofate
	$9_1 = 9_10 + 6$
	$q_2 = q_1 1 + q_2 1$
	93 - 920 + 92 (0+1)
	No.
T - 4 - 54 - 4 - 5	Bince final states are 91 \$ 92 we are
1.40	interested in solving 9, 892 only
113.45	91 = E + 9+0 + 100 + R = 0 + R P2
	$91 = \varepsilon \cdot (0)^* \Rightarrow 0p^*$
	191 = 0* 1 - 0 = d.1 = = = = = = = = = = = = = = = = = = =
	substituting this into que so
	· ·
	$9_2 = 0^*1 + 9_21$ $R = 0 + RP$
	92 = 0*1.1* R= Qp*
	RE = 91+92 = 0*+ 0*1.1*
	RE = 0*+0*1+ 1:1*= 1+

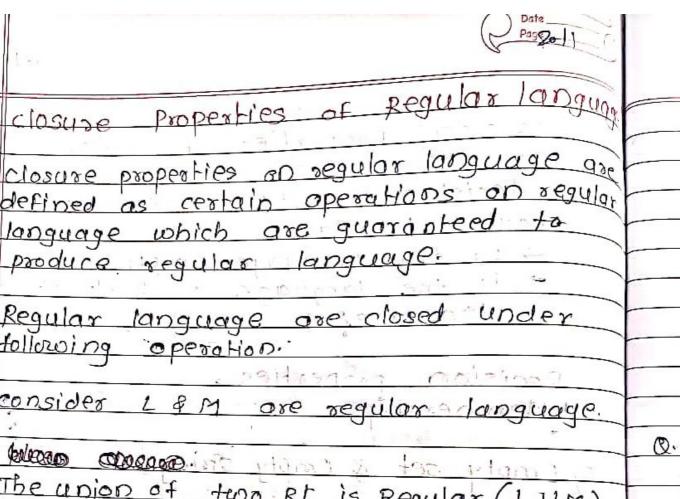


		classmate
		Page 2-08
$\bigvee$	0.3	construct RE. for the DFA given in fig.
$\forall$	2.5	Tiven in fig.
4		
+		92
4	-	0 1
+		
+		93)- 9,00,1
+		13 1 1901
7		Let us see the equation
		scr as see the equation
	1.	917.921+930+Enders ni adimini
		92 = 910
		93 = 911
		94 = 920 + 93 1 + 94 (0+1)
1		Let us some we gi first
1		= = +-, ++ int = ol
+		95 = 9404 + 960 He 960 He 960 (100 to 1)
+		
+		91= 9,01 + 9,10+ € 1 50,00 001
1		$9_1 = 9_1(01+10) + E R = Q + RP$
╁		0 =
-	-	91 = E+ 9, COI+10) > QP*
-		91 = E(01+10)* + E+= 1
_	-	
_		91 = (01+10)*
_		1 1 Commission Con is
-		Thus the Regular Expression (RE) is
-		RE = (01+10)*
-	·,	gince quis a final state, we are in trested in a only
-		since 91 15 a Hinau Stude 1
		91 01119





	Decision properties of regular language.
3.0	Burger Committee
101	A decision property is a (Boolean) question
	about à janquage.
	> is the language empty?
	> is the language a subset of another
-	in maria paramet
	a rivina manerties
	Decision properties  Membership
0\	Empty set & Empty stringarous and a
	la The union of the RE is Ferulas (1)
(3>	Equivalence & subset
11.0	2 the intersection of them RI 12 Femily ?
4)	
13.	Language Size.
	4. The difference of the safe of
(M-	in the difference of two piets Regular (.)
	The Cayen at at a Relis Regular (1)
141	
11.1 X	é une closuse apesation en a puis Rend
14180	
1.19	The concatenaion of the said
LING	
	Interpreted in 19 day - consider amount in 8.
1	
	title invested for morning in a state of
1 4 7	



Regular language are closed under following operation.

consider L&M ore regular language.

- 1. The union of two RE is Regular (LUM)
- tiquivalence of subret 2. The intersection of two Rt is Regular (LAM)
- 3. The complement of a RL is Regular ( I ) of M
- The difference of two RLis Regular (L-M)
- The Reversal of a RL is Regular CLR)(MR)
- The closure operation on a RL is Regular (1)
- 7. The concatension of TRL is regular (L.M)
- 8. A homomorphism of RC. is regular
- 9 The inverse homomorphism is of RLis Regult



Pumping Lemma.  This is a basic & important theorem		classmate  Dote  Page Dal 2
This is a basic of important theorem used for checking whether given string is accepted by regular expression or not.  This iemma tells us whether given language is Regular or not.  This is a language length of string is always even.  D=1; L=00  n=2; L=0000 and so on.  Let L= uvw  Let L= uvw  Let L= uvw  Case E  A language is a language length of string is always even.		PogeDal 2
weed for checking whether given string is accepted by regular expression or not.  This lemma tells us whether given language is Regular or not.  This is a language length of string is always even.  D=1; L=00  n=2; L=0000 and so on.  Let L= uvw  L=020 = uvivoron as a contract of the con		Pumping Lemma.
language is Regular or note    $0 \cdot 1 \cdot L = 10^{20} \cdot 1 \cdot n \times 1$      This is a language length of string is always even.    $1 \cdot L = 00$     $1 \cdot L = 00$     $1 \cdot L = 00$     $1 \cdot L = 00 \cdot 0$     $1 \cdot L = 00 \cdot 0$		This is a basic of important theorem used for checking whother given string is accepted by regular expression or not.
This is a language length of string is always even. $ \begin{array}{cccccccccccccccccccccccccccccccccc$		language is Regular or noti
This is a language length of string is always even. $ \begin{array}{cccccccccccccccccccccccccccccccccc$		
always even. $D=1; L=00$ $D=2; L=0000 \text{ and so on.}$ $Lef L=uvw$ $L=02n \text{ and } 0$ $171=02n \text{ avisor } 0$ $Case E$ $101 L=02$	Q. 1	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		almand a com
$ Z  = 02^{n} = 4 \times 10^{n} = 0.1 = 2000$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1 = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1 = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 4 \times 10^{n} = 0.1$ $ Z  = 02^{n} = 0.1$		n=2 ! 1=0000 and so oo.
Case I		$L = 0^{2h}  \text{dod}  $
Case I		z  = 02' = 40'60
15 START OF ALL		0.1
15 SASTER OF THE	-	i vie
- 1 S S 11-3 W 11	1	
+31/4 1-		15 STARTE WALL
	1-	tyli no

Date	
1 Paga 13	
	_
$0.2  L = \{0nhn \mid n > 1\}$	_
we assume Lis regular language.	
Mark 1. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	_
we will consider well for	
w= 28421 -11 : [19] TY 15131	_
iter and entired giver port	
pase q w = aabb.	
man A	
mapped with ayx	
Q ab b	
- Trong To Reform Xoonean of all aids	
W= xq! X & L	
now 1 = 2	
w = a ab ab b	
= a2 b a b2 &L	
	1
mapped with xyz	
w = 9 9 bb	
2 9 5 5	
WERYIZEL	
now i=z	
then w=aabbbb &L	1
	-
Nof	1
	)
II	1

Date Page 14
wwR/we(aih)*
abbbba a spenting appropriate
an bmck-/nimik>1 Regular.
an bn cn / n>,1 Not Regular
00 / 051 154 0.00.002
whatis pumping lemma  It is negative Test
L -> Pritest Pass undecidable  fail > Regular
fail    Regular   NOF Regular.    Not Regular + Decidable
Europing forma
5 - 1 w 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -
Secondie FA how I style.



pumping lemma.  If L is an infinite language then there exist some positive integer 'n' (pumping length) such that any string wel has length greater than equal to'n' i.e. Iwi>n then wean he devided into three parts, w= xyz satisfy following condition:  i for each i>0, xyix el  ii lyi>0  iii   xyi   < n			Date Page 2015
If L is an infinite language then  there exist some positive integer 'n'  (pumping length) such that any string  well has length greater than equal  to 'n' i.e. Iwl>n then w can be devided  into three parts, w= xyz satisfy following  condition:  i for each i>0, xyizeL	11		
there exist some positive meger of comping length) such that any string well has length greater than ectual to n' i.e. Iwi>n then w can be devided into three parts, w= xyz satisfy following condition:  if for each i>0, xy'x EL  ii 141>0	1		pumping lemmo.
(pumping length) such that gift more well has length greater than equal to 'n' i.e. Iwi>n then w can be devided into three parts, w= xyz satisfy following condition:  i for each i>0, xyizeL			
into three parts, way a condition.  i for each i>0, xyizel  ii 141>0	_		(pumping length) such that any string
into three parts, way a condition.  i for each i>0, xyizel  ii 141>0	1		to'n' i.e. Iwi>n then w can be devided
i for each i>0, xyix EL  ii 141>0			into three parts, w- aga out
ji 191>0	-		
A SMICE STATE OF THE SMICE STATE		j	for each 1>0, 2912 EL
		ji	191>0
		iii	1241 < D
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