

$$1. a \cdot b + (a+b)^* + b \cdot a + (b+a)^* + a + b$$

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

$$3. a(a+b)^*a + b(a+b)^* + b + a$$

$$4. a(a+b)^*a + a(a+b)^* + a + b$$

$$5. b^*a^*ab \cdot b^*a^*ab \cdot b^*a^*$$

$$6. b^*a^*(ab+\lambda) \cdot b^*a^*(ab+\lambda) \cdot b^*a^*$$

$$7. 0^*1^*(0+\lambda)0^*1^*(1+\lambda)0^*1^*$$

$$8. (C+1C)^* (11(C+C1))^* 011(111) (C+C1)^*$$

$$9. (aa)^* \cdot a(a)^*$$

$$10. (aa)^* \cdot a(a)^*$$

$$11. (a+b)^*(b+a)^*(bb)^*$$

$$12. (aa)^*(b+a)^*(bb)^*$$

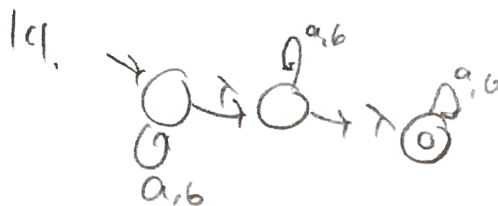
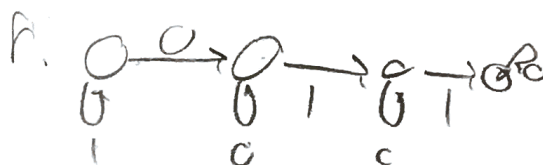
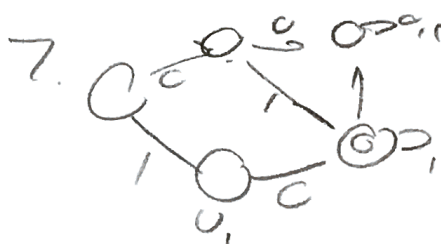
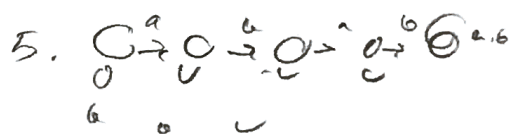
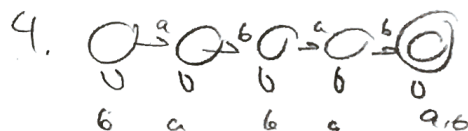
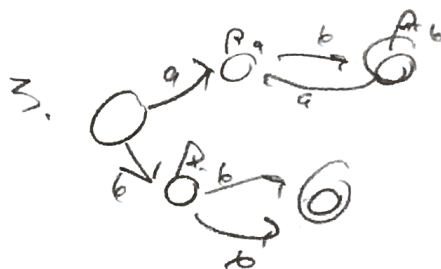
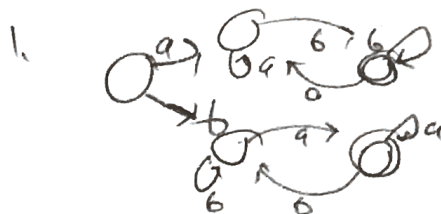
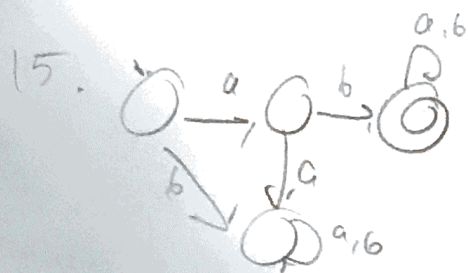
$$13. (a+b)^*$$

$$14. (a+b+\lambda)^*$$

$$15. (ab)^* + b(a+b)^*b + a + b$$

$$16. a+b^* + b(a+b)^* + ab$$

$$17. (a+b)^* + 1 + b(a+b)^*$$



1.

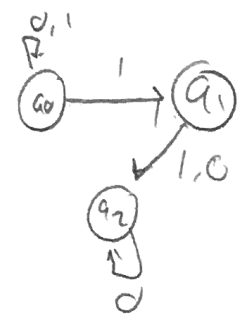
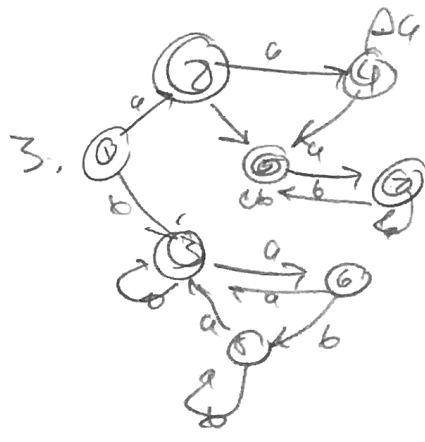
$q_0$	C	1
$q_1$	$a_1$	$a_0$
$q_2$	$a_2$	
$q_2$	0	0

2.

	a	b
S	S, P	q
P	P	q
q	q, P	q

3.

1	$\epsilon q_0$	$\epsilon q_1$	$\epsilon q_1, q_0$
2	$\epsilon q_1$	$\epsilon q_2$	$\epsilon q_2$
3	$\epsilon q_2$	$\epsilon q_2$	<del>0</del>



3. DFA is possible, there are 3 loops. The first loop is  $a^2$  and  $a^2$  is a loop. Making all 1s, 2s, 3s or no 1s is a loop. The 0s is a loop.

4. language: set of strings

Decision problem: a problem where there is a yes/no output

Recognizer: machine that accepts in some language

Generator: represents of a language.

Regular language: any language recognized by a DFA