Symmetric: Y

Transitive: Y

Antisymmetric: Y

3. Prove that $R \circ (S \circ T) = (R \circ S) \circ T$

1. (a,b) in $R \circ (S \circ T)$ [def of composition]
2. $\exists c$ s.t. $(a,c) \in (R \circ S) \land (b,c) \in (T)$ [def of composition]
3. $\exists c$ such that ($\exists d$ where $(a,d) \in R \land (d,c) \in S) \land (c,b) \in T$ [by def. $\land$ over $\exists$]
4. $\exists d$ such that ($\exists c$ where $(a,d) \in R \land (d,c) \in S \land (c,b) \in T$) [assoc.]
5. $a,b \in R \circ (S \circ T)$ [def of assoc.]

Part I

CS205

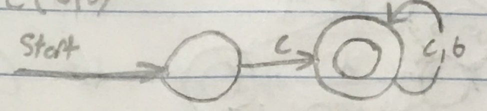
157000846

11/27/16

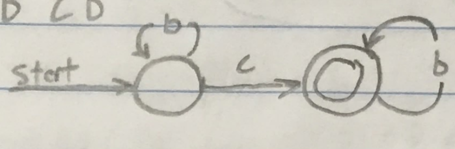
Alex Jia

HW 8

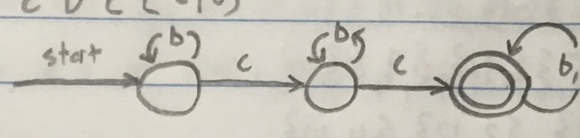
A. 1. i. $c(c|b)^*$



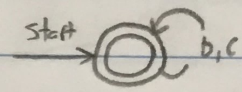
ii. b^*cb^*



iii. $b^*cb^*c(c|b)^*$

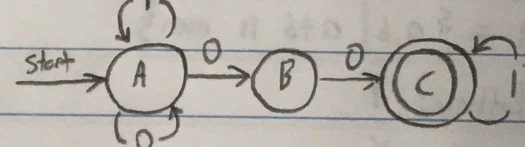


iv. b^*c^*



2. 0.

	0	1
A.	A,B	A
B.	C	
C.		C



i. Any number of "1"s and/or any number of "0"s, followed by two "0"s and any number of "1"s.

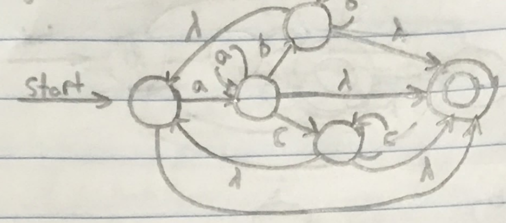
ii. $(0|1)^*00(1)^*$

iii.

	0	1
{A}	{A,B}	{A}
{A,B}	{A,B,C}	{A,C}
{A,B,C}	{A,B,C}	{A,C}
{A,C}	{A,B,C}	{A,C}

Part2

3. . Any number of single "a"s followed by an infinite number of "b"s and/or any number of single "a"s followed by an infinite number of "c"s.



for $(ab^* | ac^*)^*$

B.

1.

a. {1,4}, {2,5}, {3,6}, {4,7}
b. {1,16}, {2,25}, {3,36}, {9,81}
c. {1,4}, {2,7}, {3,12}, {4,19}
d. {1,4}, {2,7}, {3,12}, {4,19}
e. They are identical in design.

2. $R1 = \{a,b \mid a+b \text{ is even}\}$

Reflexive: Y

Symmetric: Y

Transitive: Y

antisymmetric: N; let $a=2$, $b=4$. $(2,4)$ and $(4,2)$ both work, but $a \neq b$; $2 != 4$

$R2 = \{a,b \mid a \times b \text{ is even}\}$

Reflexive: N; let $a=3$, $b=$ any even #. $a \times a = 3 \times 3 = 9$; $9 \neq$ even.

Symmetric: Y

Transitive: Y

antisymmetric: N; let $a=2$, $b=3$. $(2,3)$ and $(3,2)$ both work, but $a \neq b$; $2 != 3$

$R3 = \{v,w \mid v$ and w are strings over letters A to Z, and v is w reversed$\}$

Reflexive: N; By definition; if $w = ab$, $v = ba$. (ba, ba) are not reversals.