HW 5 - CS 331
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98/100

33) 20/20

a)

{x / x contains an even number of as}

$b^*(ab^*ab^*)^*$ 7/7

λ
aa
babab

b)

$a^*b(a^*ba^*b)^*a^*$ 7/7

c) $b^*(ab^*ab^*)^* + a^*b(a^*ba^*b)^*a^*$ 6/6

34) 20/20

a) i ✓

b) iii ✓

c) v ✓

d) iv ✓

e) ii ✓

36)

18/20

a)

Assume A is regular. Let h be a homomorphism defined by $h(a) = aa$, and $h(b) = b$. h maps A to $\{a^n b^n \mid n \in \mathbb{N}\}$ which is not regular. By thm 10.2 If A is regular then h(A) is regular, h(A) is not regular therefore A cannot be.

no, this maps $\{a^n b^n\}$ to A.

8/10

b)

$\overset{res}{A} \cap \overset{?}{B} = c \Rightarrow B$ is reg

$\boxed{\text{Credit: Cimone.}}$

Let

A be define by the regex $a^* b a^*$

Let

$B = \{x\, \{a,b,c\} \mid x \text{ is a palindrome}\}$

10/10

$A \cap B = a^n b a^n$

by proof in class $a^n b a^n$ is not regular
A is regular, therefore B cannot be regular

37)

$(0+1)^* \neq 0^* + 1^*$

20/20

$01 \in (0+1)^*$

$01 \notin 0^* + 1^*$

38)

$0(120)^* 12 \overset{\text{by } 9.14}{=} 01(201)^* 2$

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Scanned by CamScanner

39)

$$\emptyset = \lambda^*$$

$$\overset{9.17}{=} (\lambda + \emptyset)^*$$

$$\overset{9.3}{=} \lambda^*$$

40)

$$(0^* 1^*)^* \neq (0^* 1)^*$$

$$0 \in (0^* 1^*)^*$$

$$0 \notin (0^* 1)^*$$

35)

Prove A' is regular. $A \subseteq \{0,1\}^*$

$$A' = \{xy \mid x1y \in A\}$$

Since A is regular there is an NFA m st $L(m) = A$

we can make a copy of m and add a λ-transition to any state that would accept a 1 in the first m and map those to the coorespending state in the second m that the first m would have transitioned to. This will give you an NFA that decides A'. Since we can construct an NFA that decides A', A' is regular.