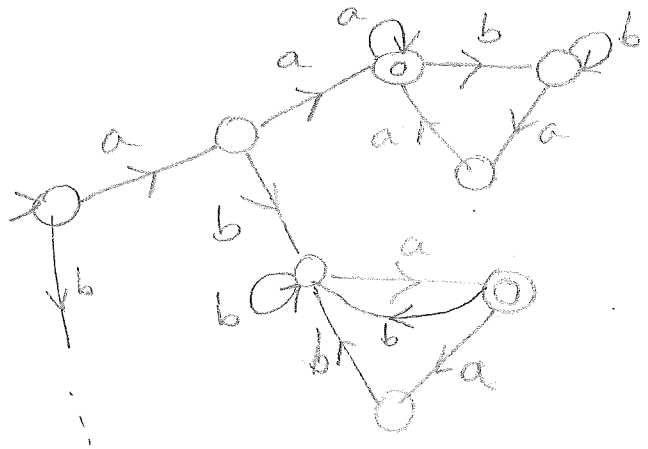
# A1 "short form" Solutions

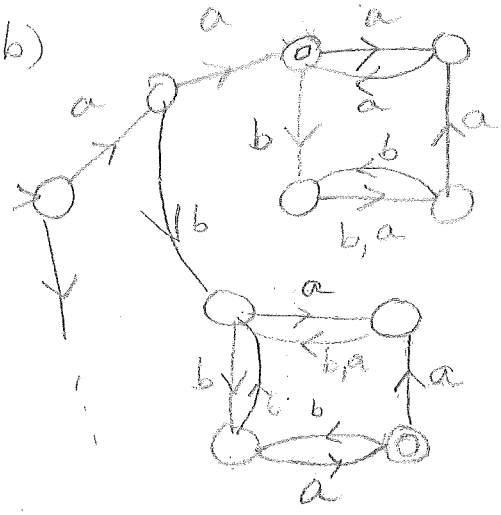
CSCI 320
2019

1. a)



missing branch is analogous.
15 states $(4 \times 3 + 3)$

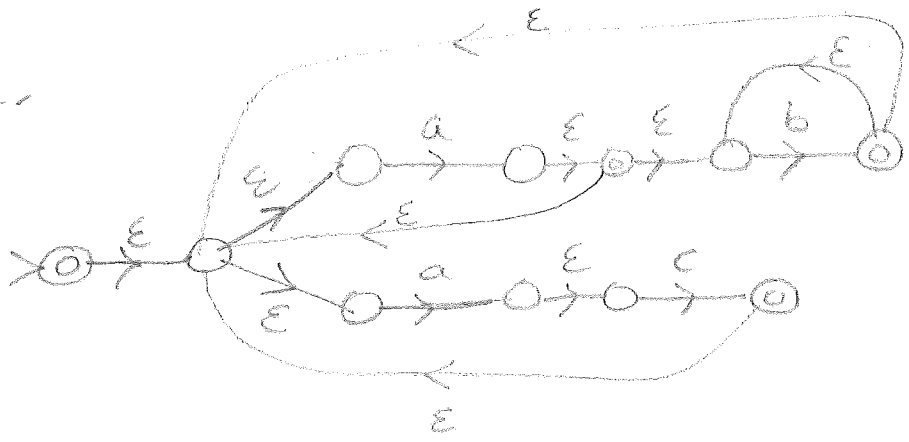
1 b)



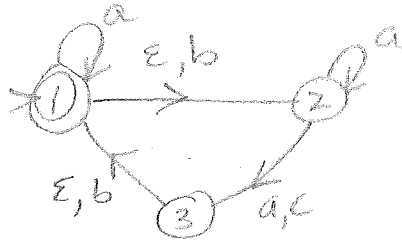
missing states analogous.
Involves adding one state to each of the 4 "gadgets"
$\Rightarrow 15 + 4 = 19$ states

1 c) $aa((aub)(aub))^*aa \cup aa$
$\cup bb \cup bb((aub)(aub))^*bb$
$\cup ab((aub)(aub))^*ba$
$\cup ba((aub)(aub))^*ab$

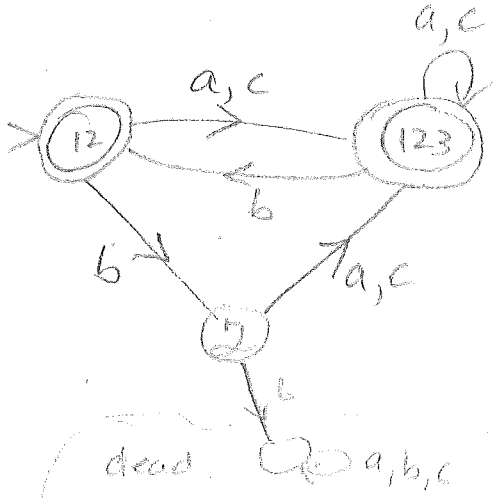
2.



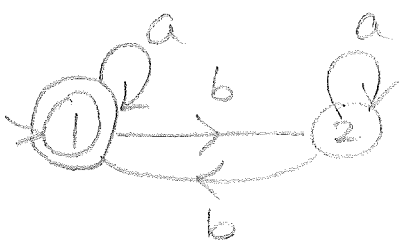
3.

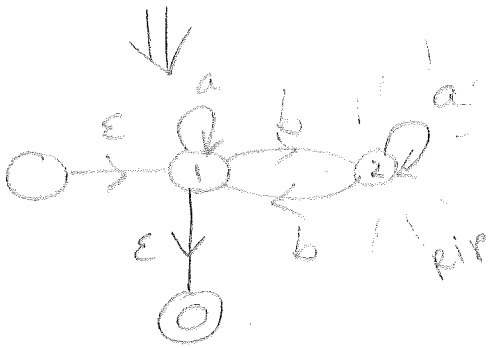


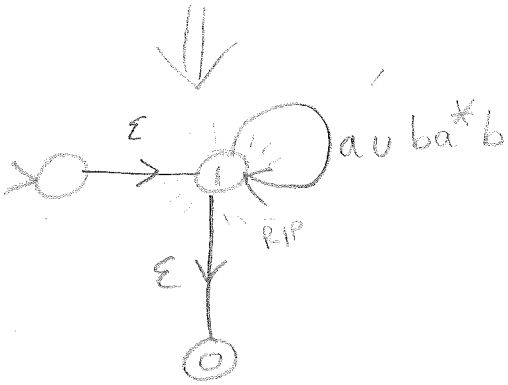
| | a | b | c |
|---|---|---|---|
| 1 | 12 | 2 | ∅ |
| 2 | 123 | ∅ | 123 |
| 3 | ∅ | 12 | 123 |
| > 12 | 123 | 2 | 123 |
| 123 | 123 | 12 | 123 |

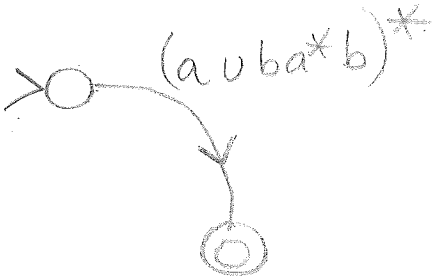


4.




r.e. is $(a \cup ba^*b)^*$