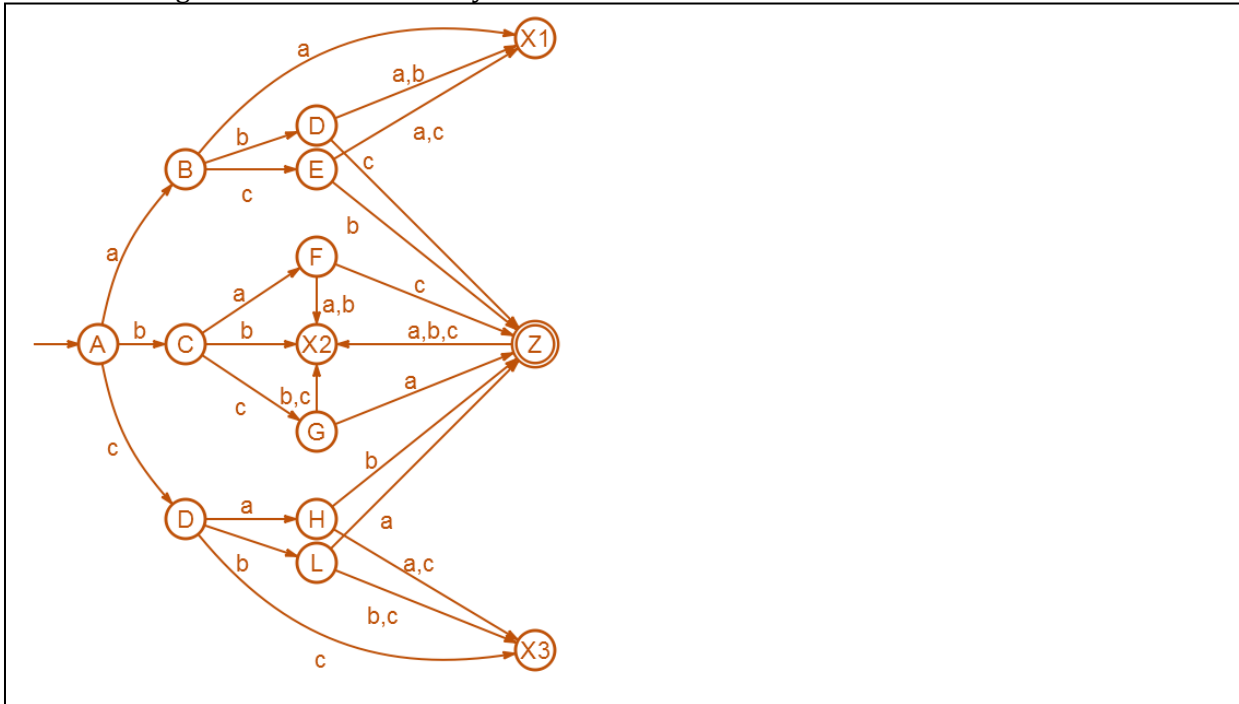


Student ID :
 Name-Surname :

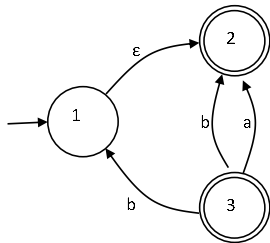
Theory of Computation midterm exam (2018-2019 Fall)

(Please use free space for draft and fit your answer to boxes.)

1. (25P) Let a company have three drones. Automatic routes for three drones can be drawn and independent tasks can be given to them. These drones must fly at different altitudes in order to be able to move around without collision. The drones are expected to rise to a height of at least 50 m and a maximum of 200 m above the ground. Here [50 100]m the height range can be called as "a", [100 150]m range as "b", and [150 200]m height range as "c". Design a DFA considering the conditions that a system that controls the altitudes of drones.



2. (25P) Convert the NFA given below to DFA.



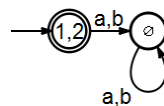
At first we must write the powerset of set of states.

$$Q' = P(Q) = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$$

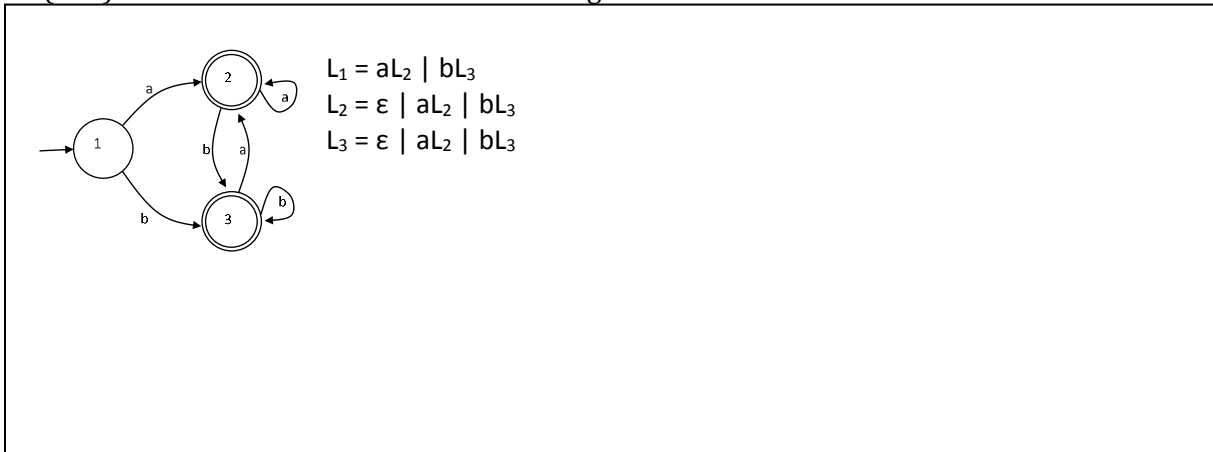
Here {1,2} is the new initial state. And new set of final states:

$$F' = \{\{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$$

New States	a	b
\emptyset		\emptyset
{1}	\emptyset	\emptyset
{2}	\emptyset	\emptyset
{3}	{2}	{1,2}
{1,2}	\emptyset	\emptyset
{1,3}	{2}	{1,2}
{2,3}	{2}	{1,2}
{1,2,3}	{2}	{1,2}



3. (25P) Write down the CFG rules of the DFA given below.



4. (25P) The language A contains strings with an equal number of letters “a”s and “b”s which is greater than the number of “c”s. Prove that the language A is not CFG by the pumping lemma.

We can choose a subset of the set of A as

$$a^{p+1} b^{p+1} c^p$$