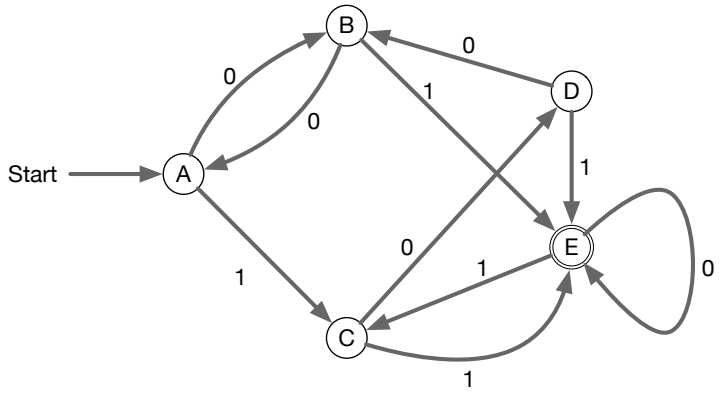
Worksheet: DFA and NFA

Problem 1:

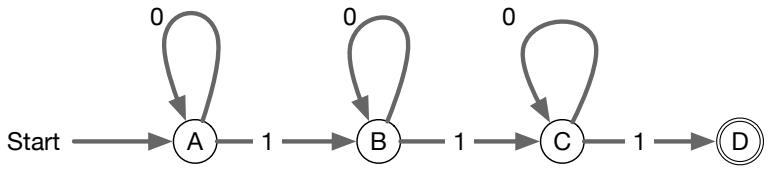
Given the following DFA



(1) Determines its transition table
(2) What is the state after processing 00011
(3) Give the shortest length strings that are accepted by the DFA starting with 1 and then starting with 0
(4) If we reverse the arrows (e.g. there would be a transition on 1 from C to A), would we have a DFA.

Problem 2:

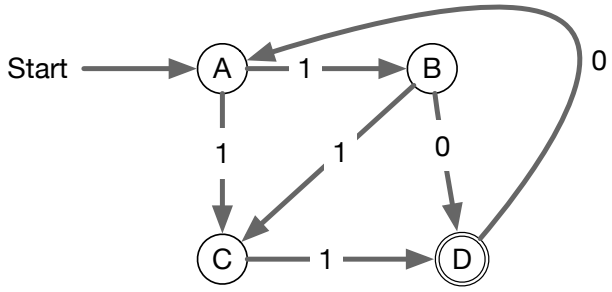
Given the following NFA:



(1) Explain why this is not a DFA
(2) Replace this NFA with an equivalent DFA
(3) What are the strings accepted by this NFA

Problem 3:

Convert the following NFA to a DFA



Solutions

Problem 1

State	0	1
A	B	C
B	A	E
C	D	E
D	B	E
E	E	C

(2) A -> B -> A -> B -> E -> C
(3) "11", "01"
(4) No, there would be three transitions on 1 going out from E and there would be no transition on 0 from C (among other problems)

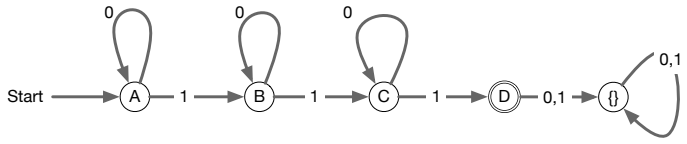
Problem 2

This is not a DFA because there is no transition from State D on a 0 or a 1.

The next-states diagram is very simple:

State	0	1
{A}	{A}	{B}
{B}	{B}	{C}
{C}	{C}	{D}
{D}	∅	∅
∅	∅	∅

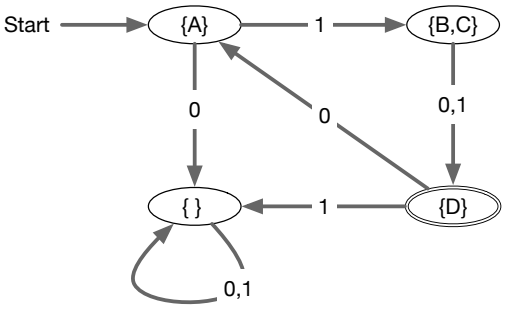
This means, we just add one state reflecting the empty set.



This DFA accepts strings with exactly three 1.

Problem 3:

State	0	1
{A}	∅	{B,C}
∅	∅	∅
{B,C}	{D}	{D}
{D}	{A}	∅



This DFA will accept strings 10 and 11, and all strings that start with them followed by a pattern 01& repeated arbitrarily many times. Here & stands for either 0 or 1.