Homework 1 - Regular expressions / DFAs

Question 1

(a)

(i) **Can be generated:** axy, aaxy **Cannot be generated:** ayx, axay
(ii) **English description:** Any number of repetitions of 'a' or 'xy' in any order, including the empty string.

(b)

(i) **Can be generated:** bozo, bozozo **Cannot be generated:** bzoo, boozzo
(ii) **English description:** Strings start with a 'b', followed by one or more 'oz', and end with an 'o'.

(c)

(i) **Can be generated:** 01, 0101 **Cannot be generated:** 10, 0110
(ii) **English description:** Any number of repetitions of '01' or '1' in any order, including the empty string.

Question 2

(a)

$(a|b)^*a(a|b)^*a(a|b)^*a(a|b)^*$

(b)

$(a|bb)^*$

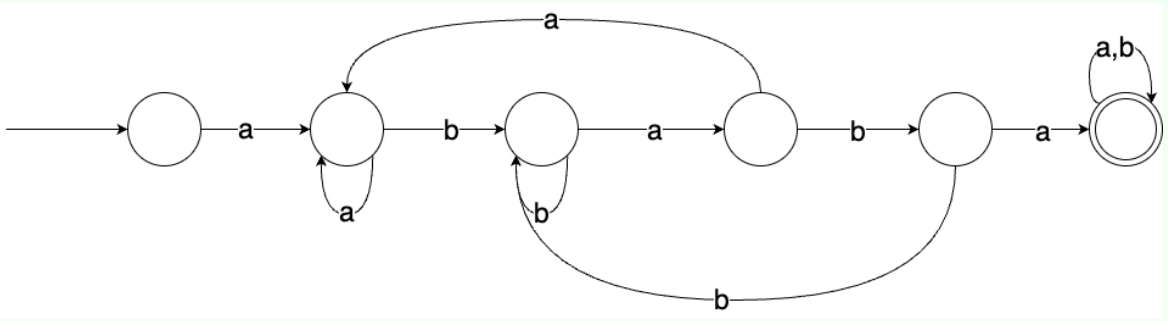
(c)

[^aeiou]* a [^aeiou]* e [^aeiou]* i [^aeiou]* o [^aeiou]* u [^aeiou]*

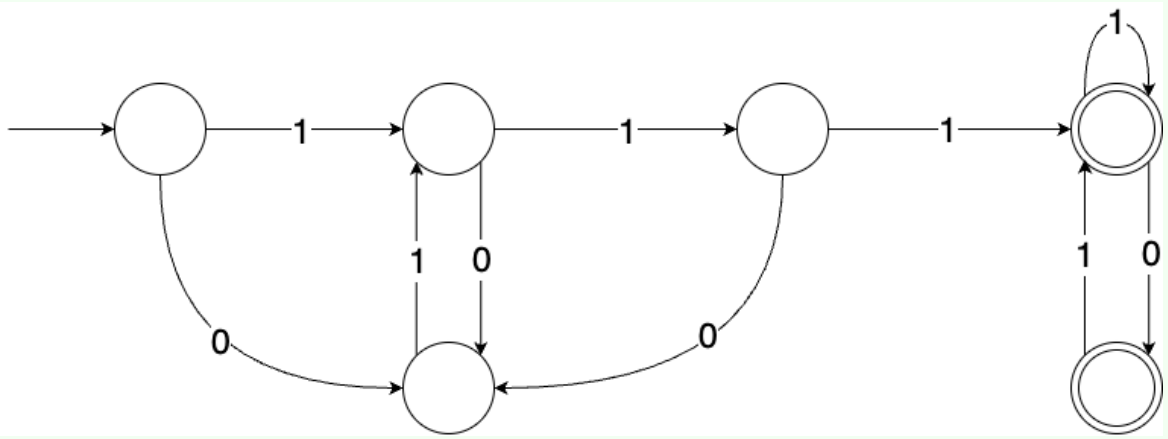
note: [^aeiou] represents any lower-case letter that is not a vowel.

Question 3

(a)



(b)

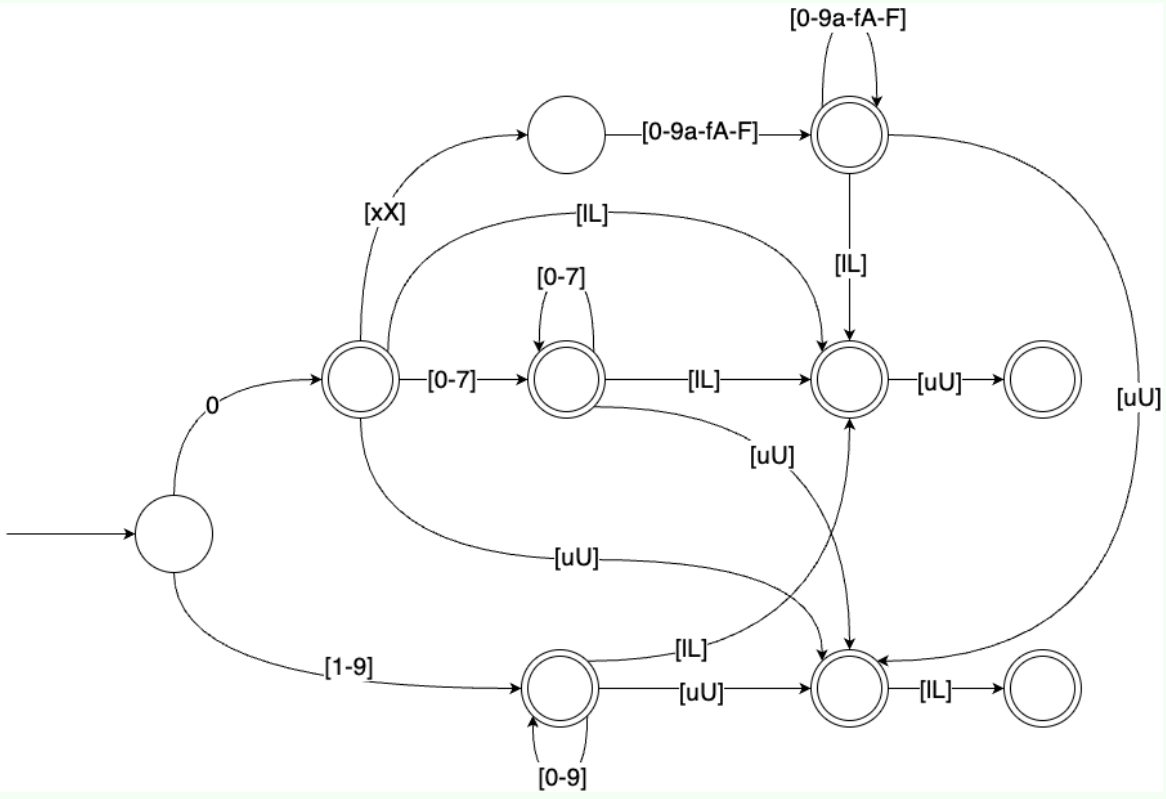


Question 4

(a)

Unsigned	:= [uU]
Long	:= [lL]
UnsignedAndLong	:= ([uU][lL] | [lL][uU])
Suffix	:= (Unsigned | Long | UnsignedAndLong)
Octal	:= $0[0-7]^*$Suffix?
Decimal	:= $[1-9][0-9]^*$Suffix?
Hex	:= $0[xX][0-9a-fA-F]^+$Suffix?
CInteger	:= Octal | Decimal | Hex

(b)



Question 5

(a)

StartSequence $:= (<! - -)$

EndSequence $:= (- - >)$

AllExceptDash $:= ([a - z0 - 9\backslash s\backslash r\backslash n! <>])$

(the "-" in between a and z, 0 and 9 are range operators not a literal dash)

AllExceptDash&GreaterThan $:= ([a - z0 - 9\backslash s\backslash r\backslash n! <])$

(the "-" in between a and z, 0 and 9 are range operators not a literal dash)

Content $:= \text{AllExceptDash}^*(-\text{AllExceptDash\&GreaterThan AllExceptDash}^*)^*$

(the "-" in front of AllExceptDash&GreaterThan is a literal dash)

Comment $:= \boxed{\text{StartSequence Content EndSequence}}$

note: \s represents a single space character, \r represents a carriage return, \n represents a newline character.

(b)