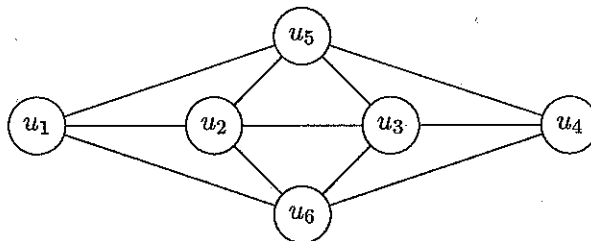


Name: Solutions

Directions: Show all work. No credit for answers without work.

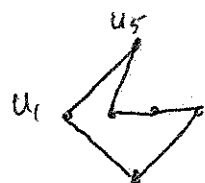
1. Let G be the following graph.(a) [1 point] What is the degree of u_5 ?

$$d(u_5) = \boxed{4}$$

(b) [2 points] Compute $\sum_{v \in V(G)} d(v)$.

$$\sum_{v \in V(G)} d(v) = 2|E(G)| = 2 \cdot 11 = \boxed{22}$$

↑
11 edges in G

(c) [1 point] Show that the 6-cycle C_6 is a subgraph of G . Many answers, such as:

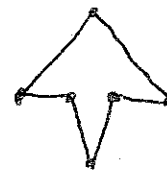
or



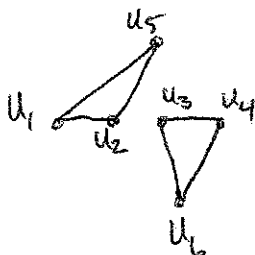
or



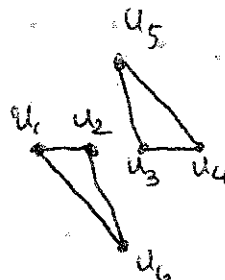
or



etc.

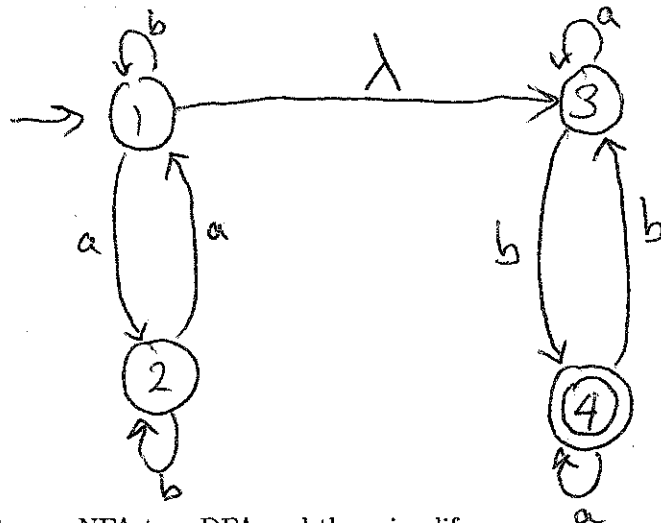
 $u_1, u_5, u_2, u_3, u_4, u_6$ $u_1, u_2, u_5, u_3, u_4, u_6$ $u_1, u_2, u_3, u_5, u_4, u_6$ (d) [2 points] Find two vertex-disjoint 3-cycles in G .

or



2. [2 parts, 2 points each] Let $\Sigma = \{a, b\}$. Let A be the language $\{w \mid w \text{ has an even number of } a\text{'s}\}$ and let B be the language $\{w \mid w \text{ has an odd number of } b\text{'s}\}$.

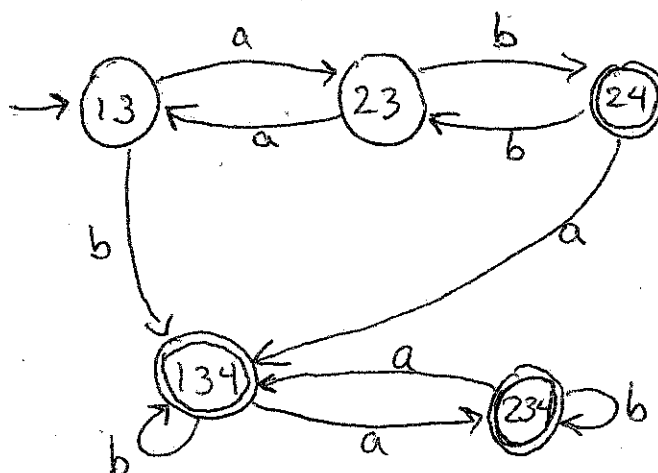
(a) Give an NFA for AB . Make your NFA as simple as possible.



(b) Convert your NFA to a DFA and then simplify.

State	a	b
1	23	134
2	13	2
3	3	4
4	4	3

DFA:



Simplified:

