Name: __Demetrius Johnson_____Date: 2-3-2021_____

No calculators are allowed. Show your work. The points for each problem are indicated. Problems with incomplete work may receive partial, or no credit.

COs: *[Question 2 fulfills Course Outcome 4 for CIS 306]*

Points: _____ / 25

1. [10 pts] Write a regular expression for a language L, using the alphabet {a, b} where all strings in the language L start with any number of a's and b's, followed by aba, or start with any number of a's, followed by bbb

$$\Sigma = \{a, b\}$$

All strings: end with (aba) or   start with (a) bbb

○ End with   aba   or   bbb .

$$(aba + bbb)$$

end with (bbb)

○ Any # of a's or b's

$$(a+b)^*$$

Solution: $(a+b)^* (aba + bbb)$

$$L = (a+b)^* (aba + bbb)$$

$(a+b)(a+b) = aa + ab + ba + bb$

$(ab)(ab) = abab$

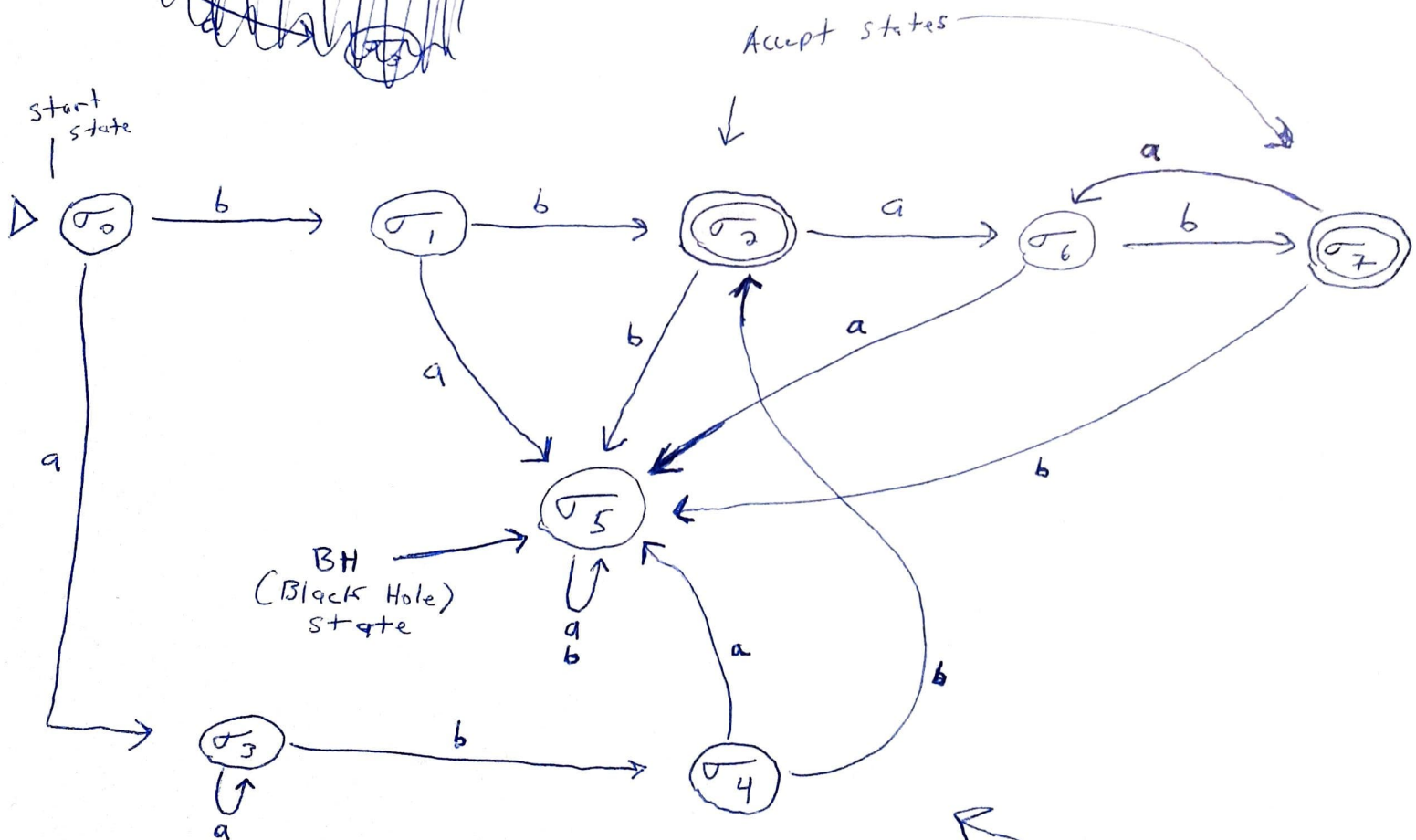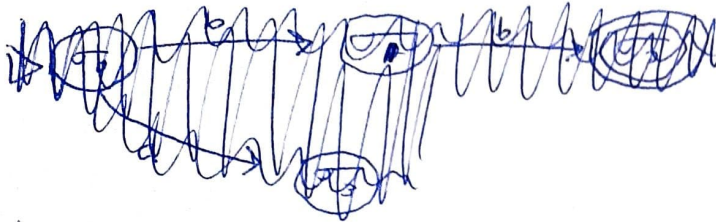$(abab)(ab) = ababab$

Remember $\quad L^* = L^0 \cup L^1 \cup L^2 \cup \ldots = \bigcup\limits_{k=0}^{\infty} L^k$

where $\quad L^0 = \lambda$

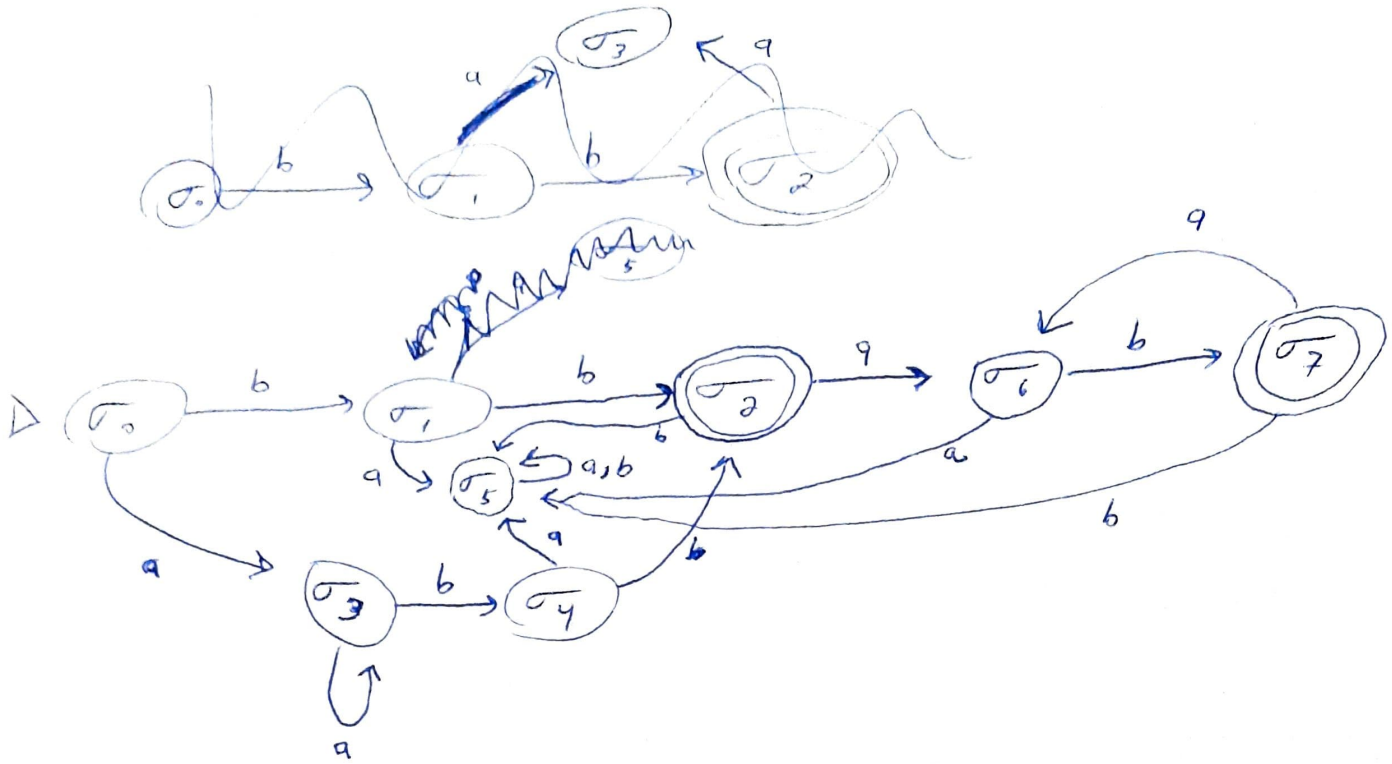2. [10 pts] Draw a finite automaton that models the regular expression **a*bb(ab)***

- $a^* \to = \{ \lambda, \# \ a^1 + a^2 + a^3 + \ldots a^n \}$

- expression means all strings in Language must start with some # of a's including $0 = \lambda$, and bb ∵ $\underline{a^*bb}$; followed by any combination of (ab)'s attached to the end, including $(ab)^0 = \lambda$.
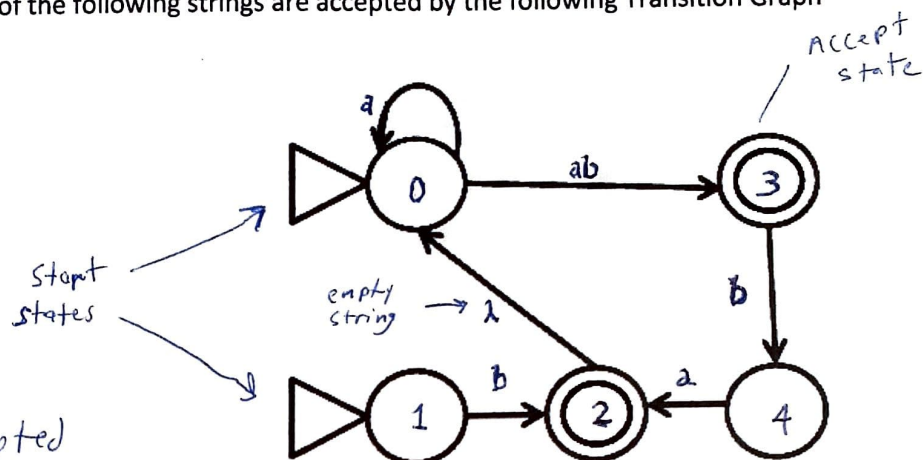

start state

Accept states

BH (Black Hole) state

Final Solution

Shown / Testing
Work
for question 2

3. [5 pts] Determine which of the following strings are accepted by the following Transition Graph (TG)

     a. ba
     b. baab
     c. abbaab
     d. baaabba
     e. ababaab

Accept state

Start states

empty string → λ

Accept state

* If even one path yields a finish at Accept state, then string is Accepted

* Decided to make table just like Prof. Baugh did in video.   Accept state

* C = crash   W = waiting/stuck/need more input

	String input	Paths (Note: Some have too many paths, so I stop when I find solution)	Accept?
a.)	ba	$0 \to C$; $1 \to 2 \to 0 \to 0$; $1 \to 2 \to 0 \to a(b) \to w$ (No)	No
b.)	baab	$0 \to C$; $1 \to 2 \to 0 \to 0 \to C$; $1 \to 2 \to 0 \to a(b) \to C$; $1 \to 2 \to 0 \to 0 \to ③$	Yes
c.)	abbaab	$0 \to 0 \to C$; $0 \to 3 \to 4 \to 2 -$ $\to 0 \to 0 \to C$; $0 \to 3 \to 4 \to 2 \to 0 \to ③$ $1 \to C$;	Yes
d.)	baaabba	$0 \to C$; $1 \to 2 \to 0 \to 0^3 \to C$; $1 \to 2 \to 0 \to 0^3$ $\to 3 \to 4 \to 2$	Yes
e.)	ababaab	$0 \to 3 \to C$; $1 \to C$; $0 \to 0 \to C$	No