

Name: _____ Date: _____

- Construct a finite-state machine that models a vending machine accepting only quarters that gives a container of orange juice when 50 cents has been deposited, followed by a button being pushed. (The possible inputs are quarters and the button, and the possible outputs are nothing, orange juice, and a quarter. The machine returns any extra quarters.)

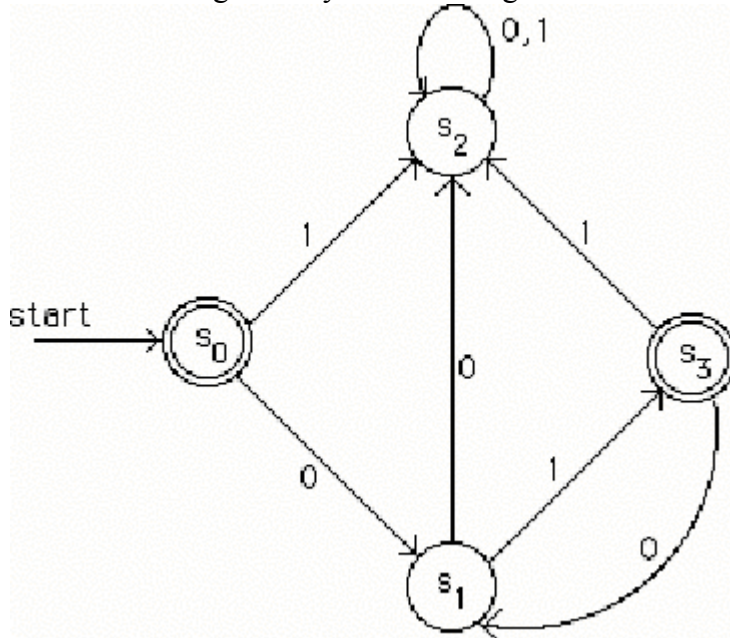
Use the following to answer question 2.

In the questions below determine the output for each input string, using this state table.

	f input:		g input:	
	0	1	0	1
s_0	s_1	s_2	1	1
s_1	s_2	s_0	0	0
s_2	s_1	s_3	1	1
s_3	s_3	s_1	0	1

- 10111.

- Find the set recognized by the following deterministic finite-state machine.

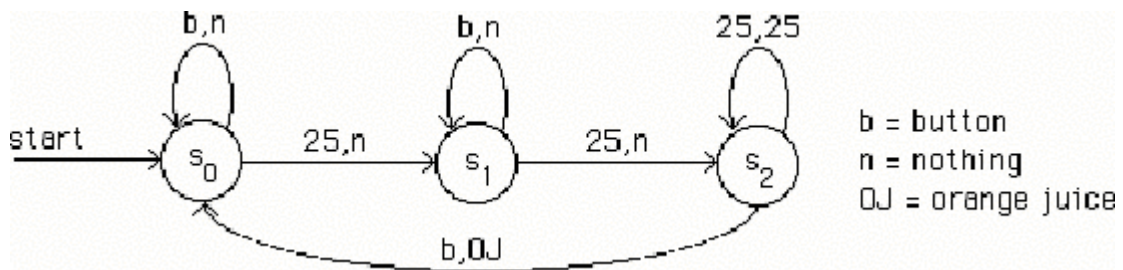


4. Let $A = \{0,11\}$. Find A^2 .

5. Prove that $5x^4 + 2x^3 - 1$ is $\Theta(x^4)$.

Answer Key - Untitled Exam-1

1.



2. 11011.

3. The set represented by $(01)^*$.

4. $\{00,011,110,1111\}$.

5. $5x^4 + 2x^3 - 1$ is $O(x^4)$ since $|5x^4 + 2x^3 - 1| \leq |5x^4 + 2x^4| \leq 7|x^4|$ (if $x \geq 1$). Also, x^4 is $O(5x^4 + 2x^3 - 1)$ since $|x^4| \leq |5x^4 + x^3| \leq |5x^4 + 2x^3 - 1|$ (if $x \geq 1$).