EEE/CSE 120

Answer Sheet
Capstone Design Project

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Instructor: Matar

Class Time:3 - 4:15 Tuesday, Thursday

Date: November 27, 2019

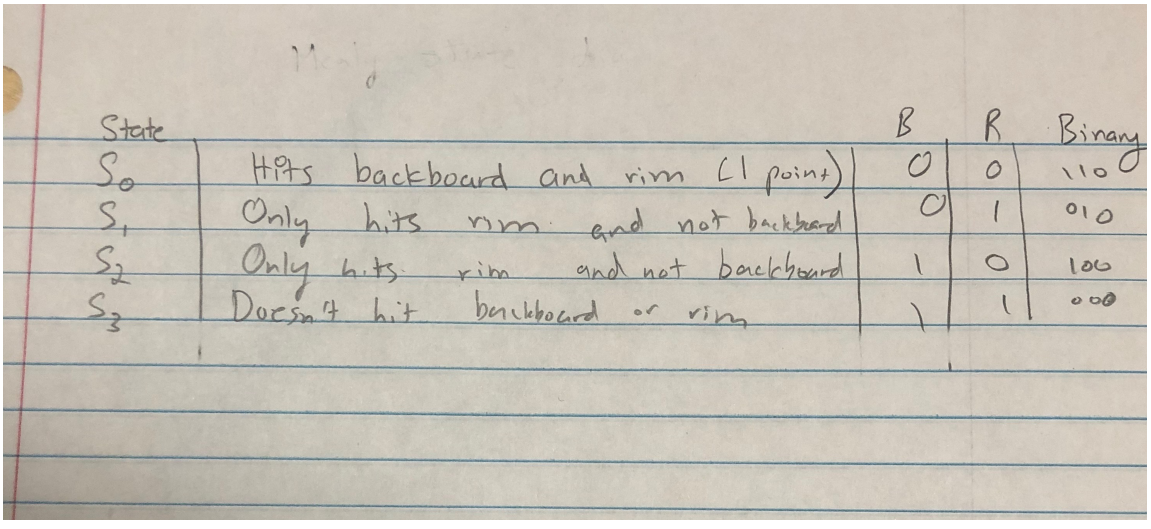
Task C-1: Design of Synchronous Sequential Machines

Design #1 (Mealy machine)[1]: What assumptions did make in the design of this machine?

I assumed that the mealy machine would be easier as the program will quit after it Rea

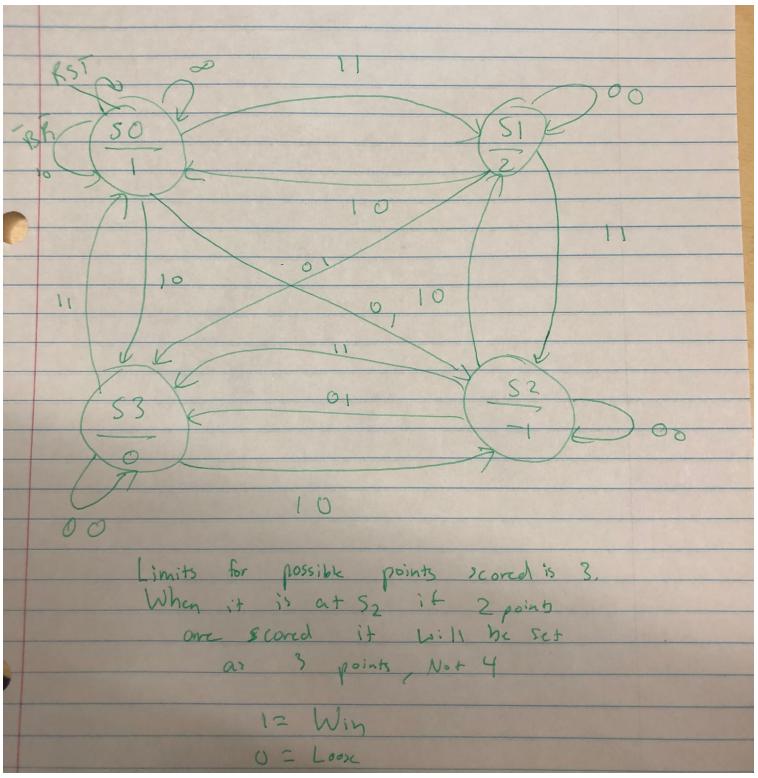
One of the assumptions that I made was that the score cannot go under 0 (which could happen when the ball hits the backboard only). One other assumption that I made was that the score cannot go past 3 points. Even when the player has two points and then hits the rim, the hardware should display 3 points, not 4. Once the player has 3 points the light turns on, indicating that the game has been won.

Create a state definition table here that describes in English what each state in your machine means and what binary values you have assigned to represent each state.

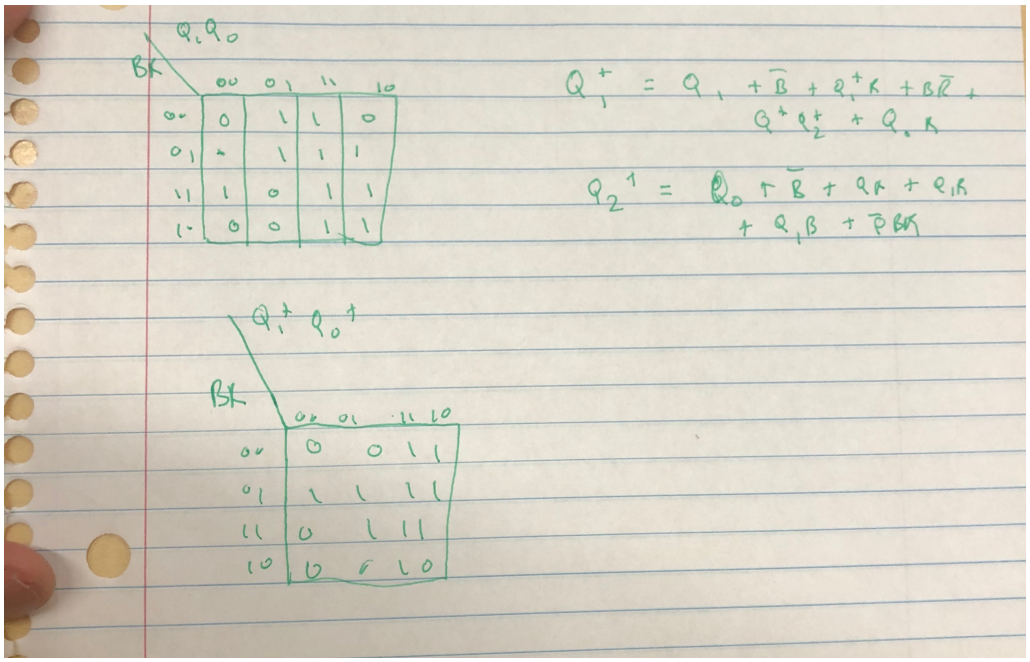


State		B	R	Binary
S_0	Hits backboard and rim (1 point)	0	0	110
S_1	Only hits rim and not backboard	0	1	010
S_2	Only hits rim and not backboard	1	0	100
S_3	Doesn't hit backboard or rim	1	1	000

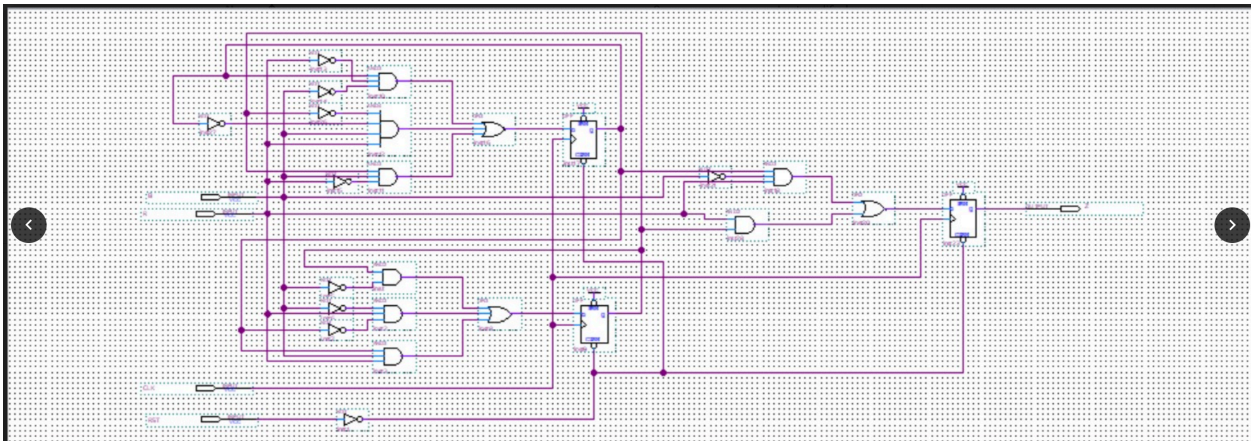
[1] Even if you have not used the design techniques taught in class, the machine you arrive at will fall into either the Mealy Machine or Moore machine class.

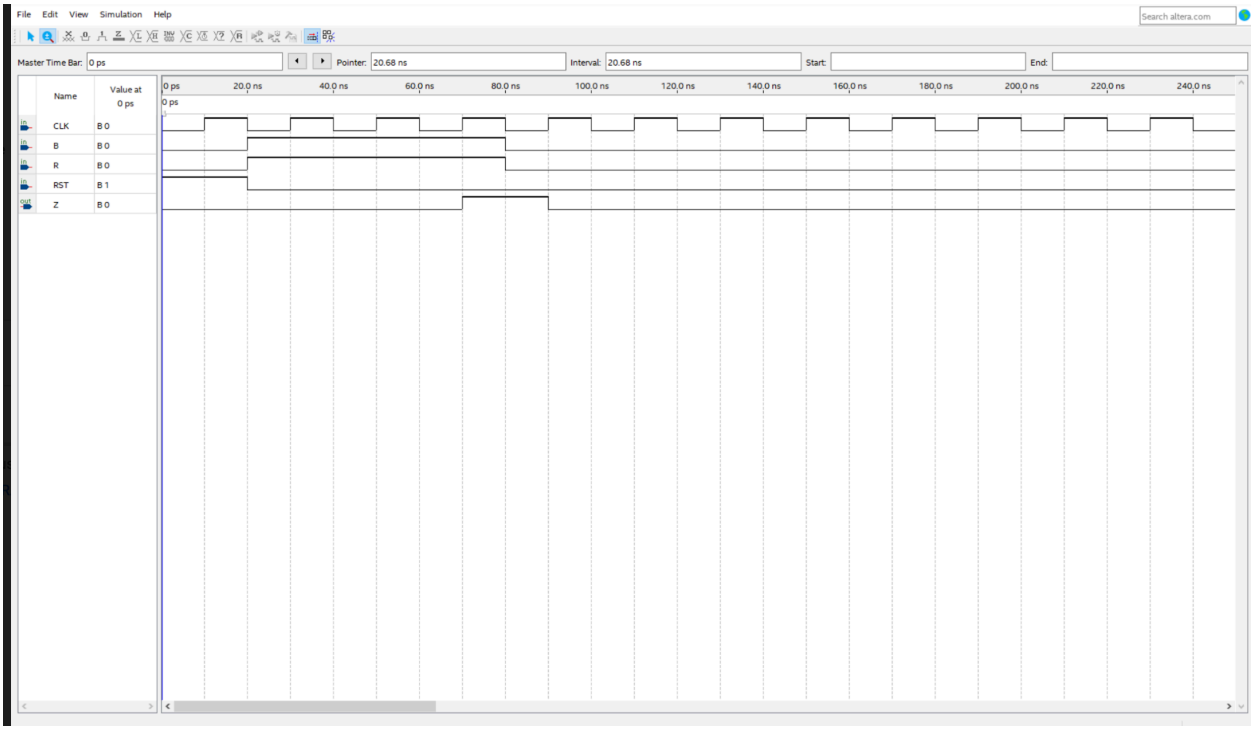


Create tables here to display your state diagrams, state transition tables and Karnaugh maps used in your design process. (You can do this by hand if you wish.)



Cut and paste your Quartus schematic and timing diagram simulation for design #1 (Mealy machine) here:

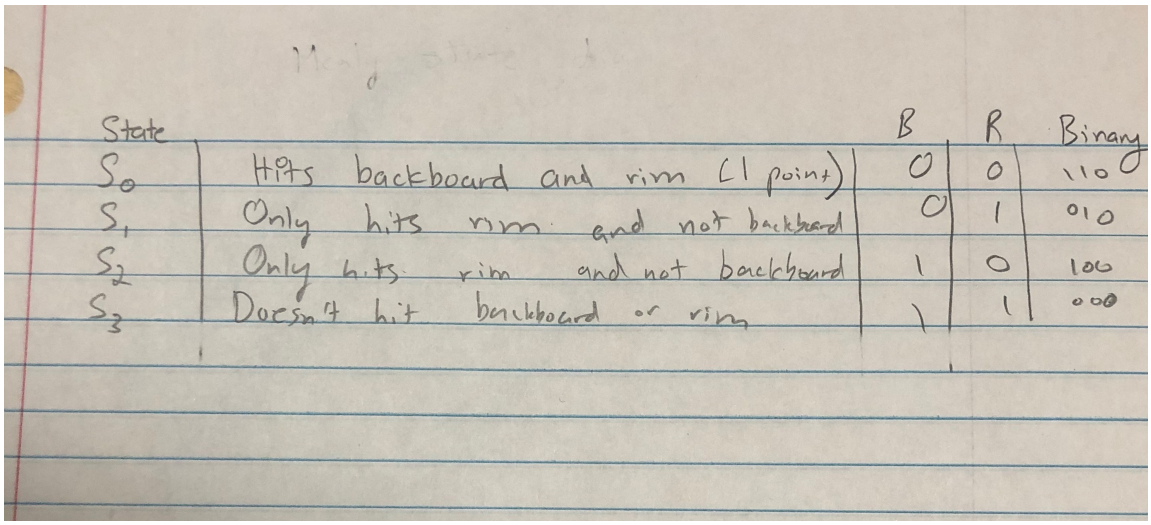




Design #2 (Moore machine): What assumptions did you make in the design of this machine?

My thought process for this machine was that the state would be a value and there would be 0 when referring to the winning state. If the correct amount of points was inputed, you could win state one and two. Also assumed that there will not be a reset

Create a state definition table here that describes in plain English what each state in your machine means and what binary values you have assigned to represent each state.



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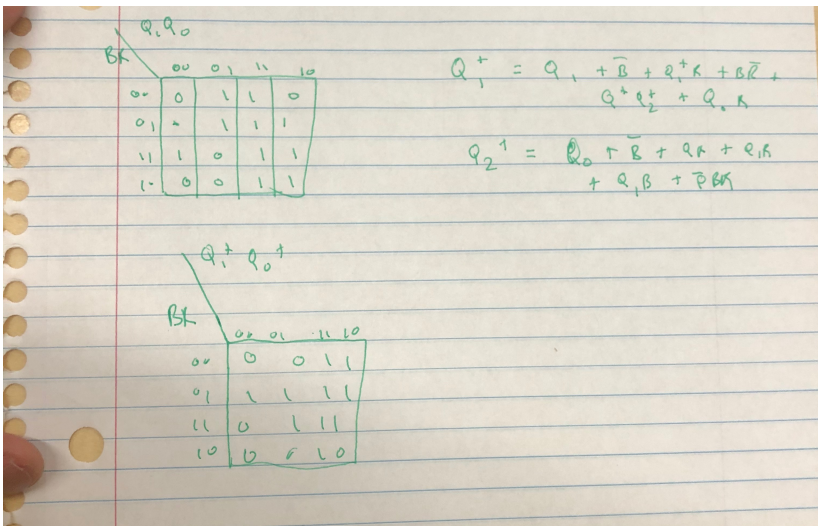
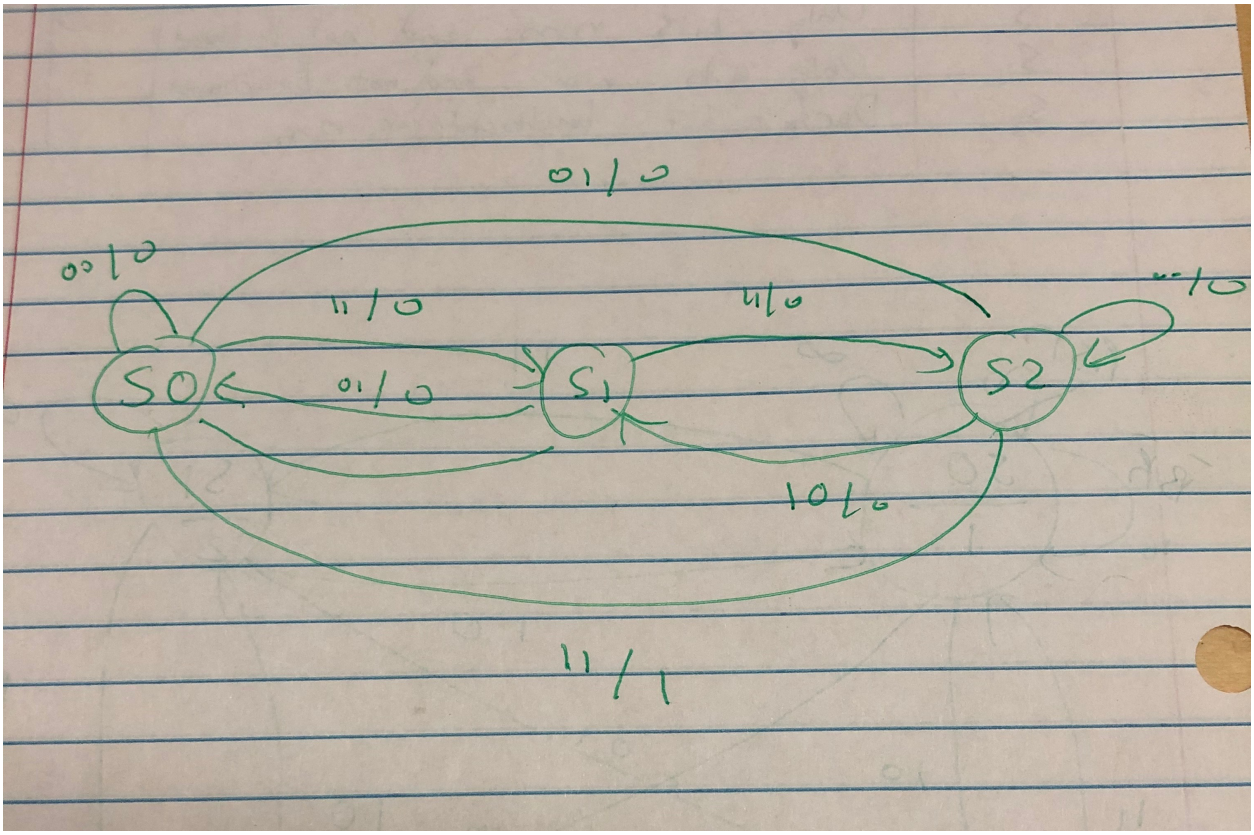
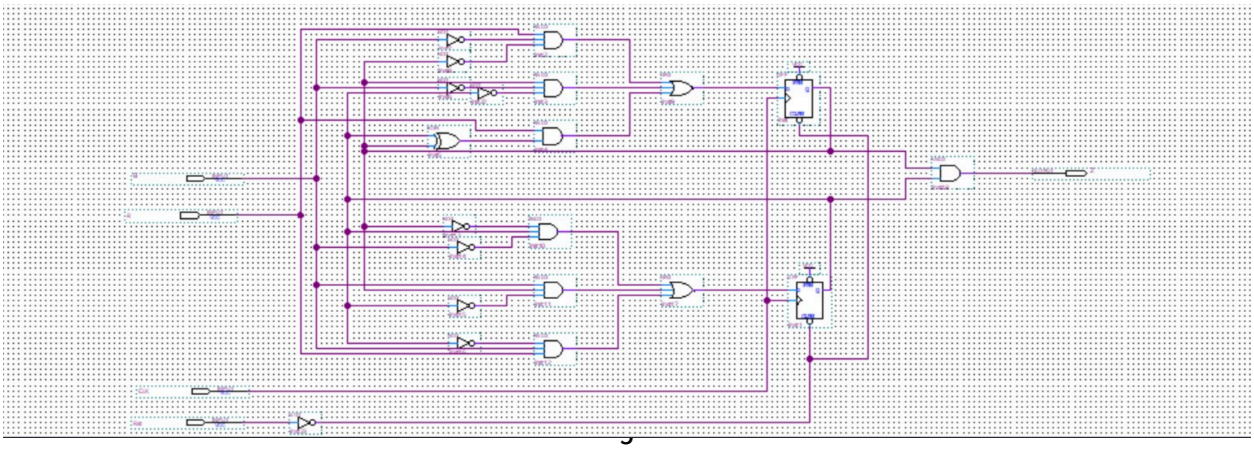
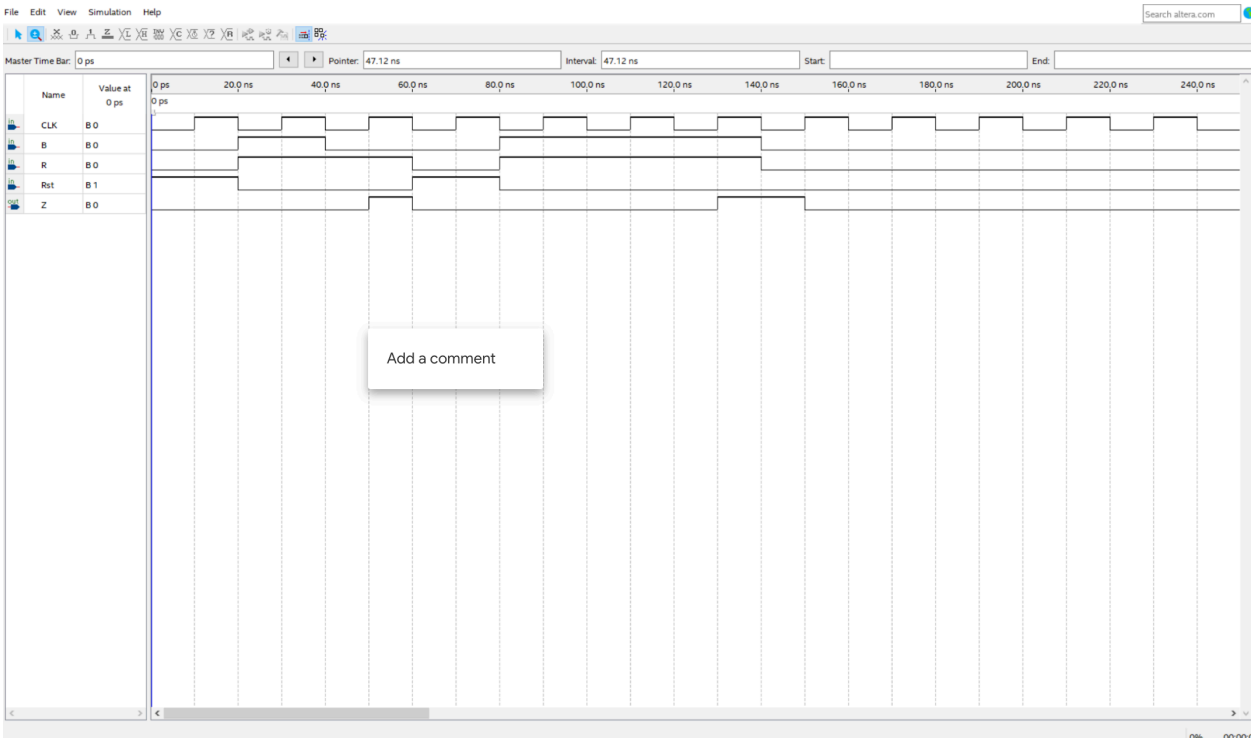




Create tables here to display your state diagrams, state transition tables and Karnaugh maps used in your design process. (You can do this by hand if you wish.)



Cut and paste your Quartus schematic and timing diagram simulation for design #2 (Moore machine) here:



Task C-2: Simulate Both Designs in the Lab in Presence of the TA

Demonstrate that both of your circuits meet the completed design specification to the laboratory assistants and have the TAs apply a grade.

Grade: 1st Design 15/15 Grade: 2nd Design 10/15

Task C-3: Determine Criteria and Weighting for Judging Your Designs

Using the guidelines in the laboratory manual, list your criteria and associated weights here:

Criteria

Criteria	Weight
Number of gates	20 points for mealy, 20 for Moore
Number of flip flops	10 for moore, 10 for mealy
Machine understanding	7 for moore, 3 for mealy
Working standard	5 for moore, 5 for mealy
Amount to build	5 for moore, 5 for mealy

Weight

Task C-4: Apply the Criteria to Pick the Best Design

Describe how you applied the criteria and weighting system in the above task to pick the best design.

My moore displayed the light but did not display the score correctly. Not the other hand, my mealy worked

Which design is better based on your criteria and weighting system?

Moore

Task C-5: Upload One Design to the FPGA Board in the Laboratory

Demonstrate to a laboratory assistant that one of your designs works according to your completed specification.

CAPSTONE DESIGN PROJECT: LAB REPORT GRADE SHEET

Nam _____

Instructor Assessment:

Grading Criteria	Max Points	Points lost
Template		
Neatness, Clarity, and Concision	5	
Description of Assigned Tasks, Work Performed & Outcomes Met		
Task C-1: Design of Synchronous Sequential Machines	22	
Task C-2: Simulate Both Designs	30	
Task C-3: Determine Criteria and Weighting for Judging Your Designs	5	
Task C-4: Apply the Criteria to Pick the Best Design	8	
Task C-5: Upload One Design to the FPGA Board in the Laboratory	30	
Additional Design Features	(up to 10 extra points)	
Self-Assessment Worksheet (The content of the self-assessment worksheet will not be graded. Full credit is given for including the completed worksheet.)	(2 extra points)	
Lab Score	**Points lost**	
	Late Lab	
	Lab Score	

SELF-ASSESSMENT WORKSHEET

Put an 'X' in the table below indicating how strongly you agree or disagree that the outcomes of the assigned tasks were achieved. Use '5' to indicate that you 'strongly agree' and '1' to indicate that you 'strongly disagree'. Use 'NA', Not Applicable, when the tasks you performed did not elicit this outcome. Credit will be given for including this worksheet with your lab report. However, your **responses will not be graded**, they are for your instructor's information only.

Table 1: Self-Assessment of Outcomes for the Capstone Design Project Lab.

After completing the assigned tasks and report I am able to:	5	4	3	2	1	NA
Use classical design techniques (i.e., state diagrams, state transition tables, and Karnaugh Maps), to design a synchronous sequential machine starting with a functional specification.						
Make assumptions to complete an incomplete functional specification.						
Write a complete functional specification.						
Build, and debug a synchronous sequential machine.						
Develop reasonable engineering criteria for comparing different designs.						
Apply engineering criteria to select a 'best' design.						

Write below any suggestions you have for improving this laboratory exercise so that the stated learning outcomes are achieved.