ECE 271 Homework #2 solution

1. Consider the following FSM state table:

|  |  |  |
| --- | --- | --- |
| present state | next state*r* = 0 *r* = 1 | output |
| A |  F D | 0 |
| B |  E C | 0 |
| C |  B A | 1 |
| D |  F F | 0 |
| E |  C B | 1 |
| F |  A F | 0 |

1. **(2 points)** Reduce this FSM to minimal form. If there are equivalent states, redo the state table with the reduced number of states.

The implication table indicates states A, D and F are all equivalent. You may eliminate any two of them; it is your choice. (I choose to keep A) This gives the following reduced state table:

|  |  |  |
| --- | --- | --- |
| present state | next state*r* = 0 *r* = 1 | output |
| A |  A A | 0 |
| B |  E C | 0 |
| C |  B A | 1 |
| E |  C B | 1 |

1. **(1 point)** How many FFs are needed for the FSM? (If it can be reduced, answer this question with respect to the reduced FSM.)

Two FFs are needed

1. **(2 points)** Draw the state diagram for a FSM that detects the sequence *r* = 0101 (without overlaps).



1. **(2 points)** The FSM in problem 2 can be implemented with 3 FFs. Assume the state assignments are A = 000, B = 001, C = 100, D = 110 and E = 010. Draw a schematic for the FSM in problem 2.

Since I don’t have a schematic capture system, in this solution I will only give the excitation equations. (Students, however, must provide a schematic that correctly implements these equations.)



1. **(3 points)** Draw the state diagram for the circuit given in Problem 7.12 in the textbook. (Use the state assignments given in the problem statement.)

