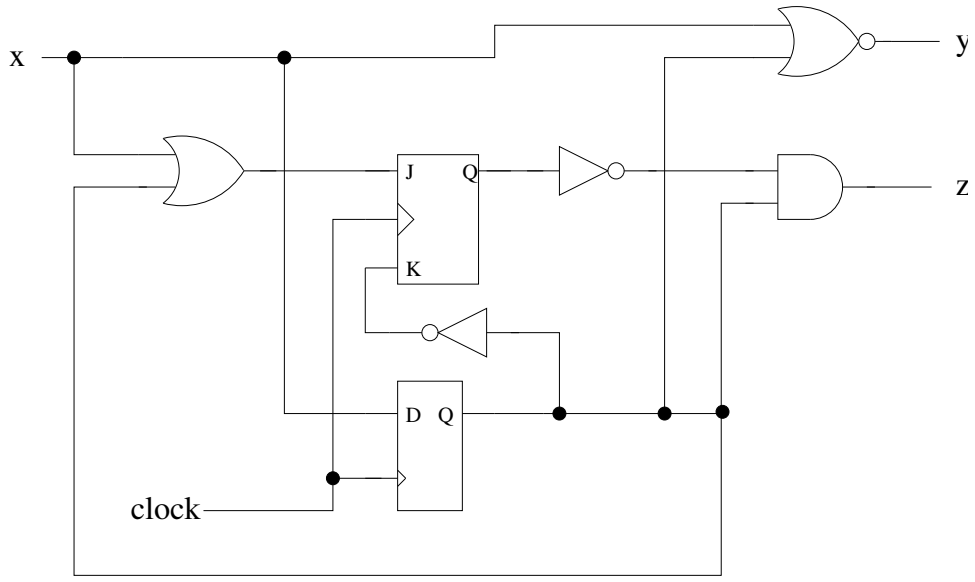
EE 231

Homework 12

Due November 22, 2010

1. Consider the circuit below:

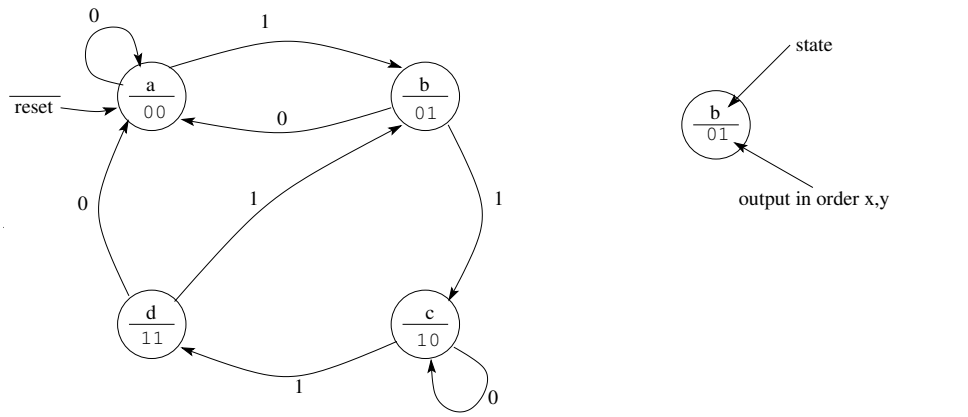


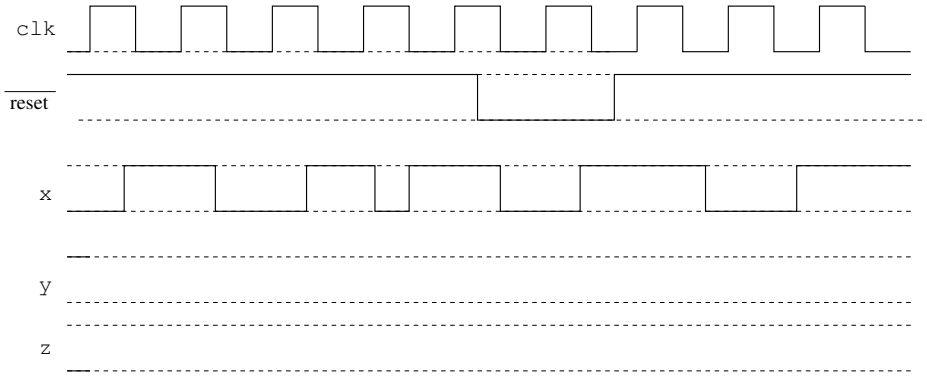
(a) Is this a Mealy machine or a Moore machine? Explain.

(b) Find the state transition table for the circuit.

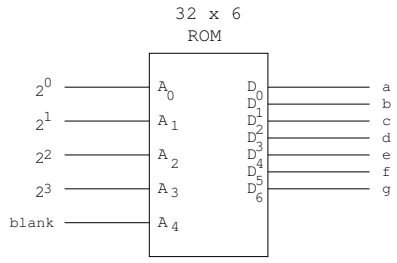
(c) Draw the state transition diagram for the circuit.

2. Consider the state tranition diagram below for a state machine with one input x (plus *clock* and $\overline{reset}$) and two outputs y and z. Complete the timing diagram for the outputs y and z. You do not have to find the state transition table. You should be able to go directly from the state diagram to the timing diagram.





3. The 32 x 7 ROM, as shown below, is to be programmed as a 7-segment decoder with blanking. It is used to drive a seven-segment LED where the inputs are active low (a 0 turns on the segment, a 1 turns off the segment). When the `blank` input is high, all the segments `a` through `g` should be high. When the `blank` input is low, the 4-bit hex value should be displayed on the seven-segment display. For example, when the input is 00010, the display should be active, and should display a 2, so segments `a`, `b`, `d`, `e` and `g` should be low, and segments `c` and `f` should be high. Specify the truth table for the ROM.



4. Specify the size of a ROM (number of words and number of bits per word) that will accomodate the truth table for the following combinational circuit components:

   (a) a binary multiplier the multiplies two 6-bit binary words.

   (b) a greatest common divisor generator, which finds the greatest common divisior of two eight-bit numbers.

   (c) a quadruple two-to-one line multiplexer with common select and enable inputs.

5. Derive the PAL programming table for a 4-bit decimal-to-gray-code converter. The Gray code table is on Page 22 of the text. The input should be the 4-bit decimal number, and the output should be the Gray code for that number. Draw the corresponding fuses on the attached PAL figure.

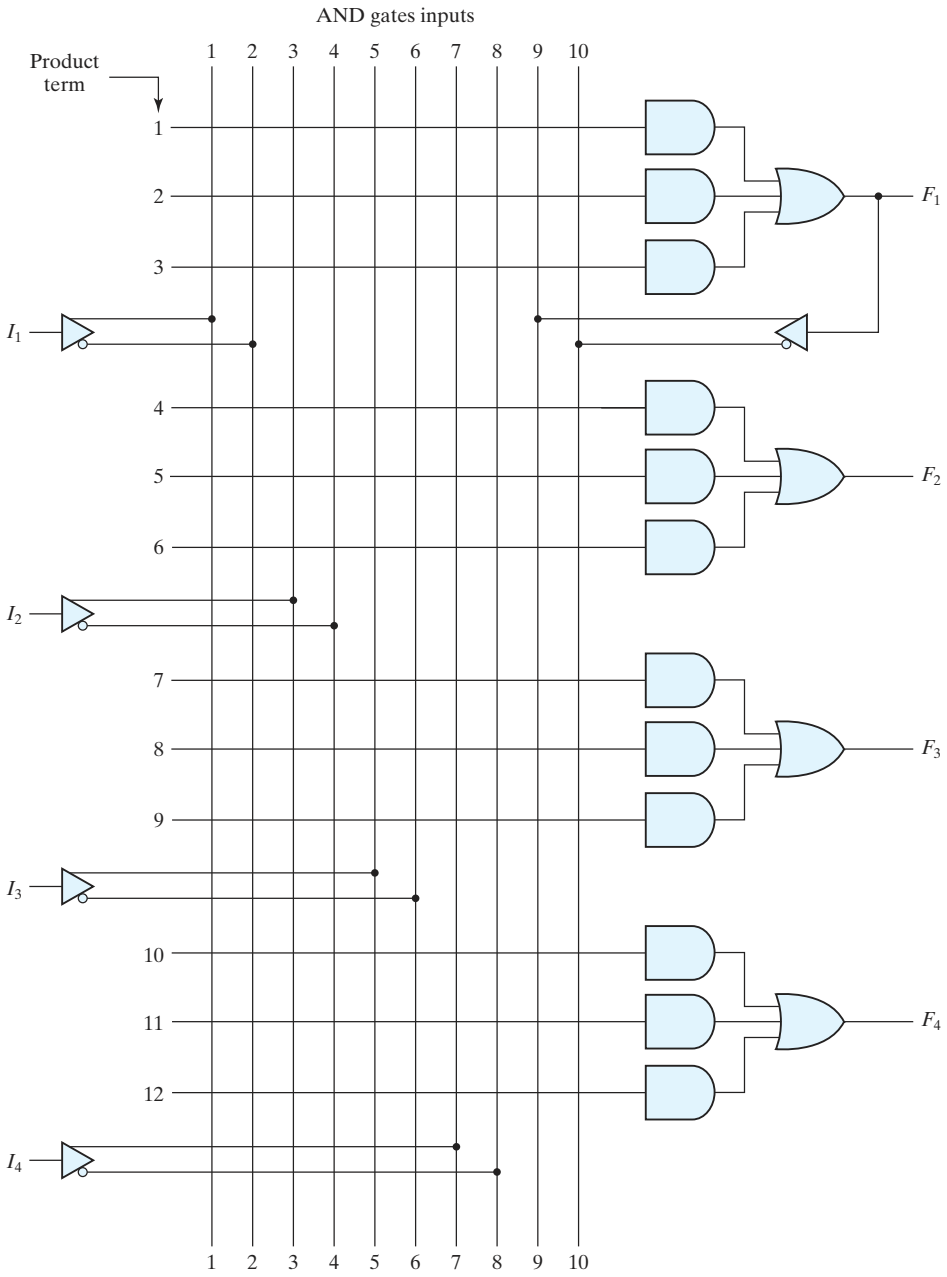


Figure Number: 07 16
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