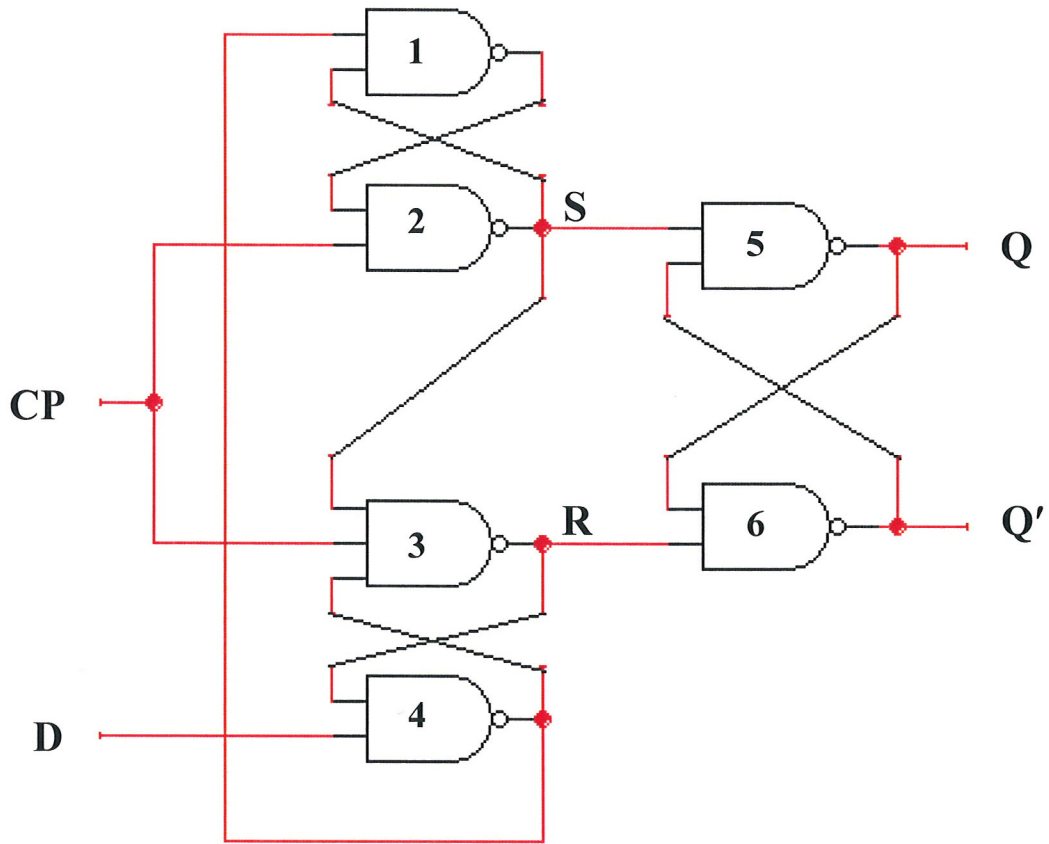


(a) (2points) The circuit shown below implements a positive edge-triggered D flip-flop using 6 NAND gates. Assuming that each NAND gate is replaced with NOR gate, what is the function of this new circuit? – Explain your answer.



(b) (2 points) Consider a single input, single output Mealy-style sequence detector such that $Z=1$ if and only if the input x has been alternating for last two clock cycles. In other words, the output $Z=1$ if and only if the input sequence 010 or 101 is detected.

For example: $x = 0010100011101000\dots$
 $Z = 0001110000001100\dots$

Implement this sequence detector using an 8-bit serial-in, parallel-out shift register (shown below) and a few gates. This shift register has a single serial input (SI), and 8 outputs A,B,...,G,H. Assume that initially the register is cleared.

