

Homework 5

Due: Friday, Jan 20, 2023

- This homework is due on or before Friday, Jan 20, 2023.
 - Hand in your completed handwritten homework to me in my office.
 - There is a 50% penalty per day for late submission.
 - Copied homework will be awarded 0 marks.
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1. Show how to implement a JK flip-flop with a D flip-flop.
2. Show how to implement a D flip-flop with a T flip-flop.
3. Show how to implement a JK flip-flop with a T flip-flop.
4. Design a mod-6 counter, which counts in the following sequence: 0, 1, 2, 3, 4, 5 and repeat. The counter counts if its enable input, w, is equal to 1, and does not count if w is equal to 0. If the counter, by accident, runs into an unused state (6 or 7), it should transition to state 0 with the next clock trigger to avoid being stuck in an unused state.
 - A) Draw the state diagram and next state table.
 - B) Implement this counter using D flip-flops.
5. Consider the design of a 4-bit BCD counter that counts in the following way: 0000, 0001, 0010, 0011, ..., 1001 and back to 0000.
 - A) Draw the state diagram and next state table.
 - B) Implement this counter using D flip-flops.
6. The 4-bit Johnson counter advances through the sequence: 0000, 1000, 1100, 1110, 1111, 0111, 0011, 0001 and repeat.
 - A) Implement this counter using D flip-flops.
 - B) Implement this counter using T flip-flops.