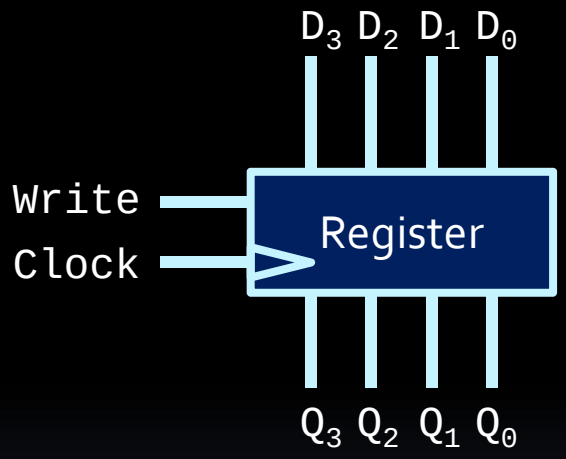
Week 6 Lectorial

Question #1

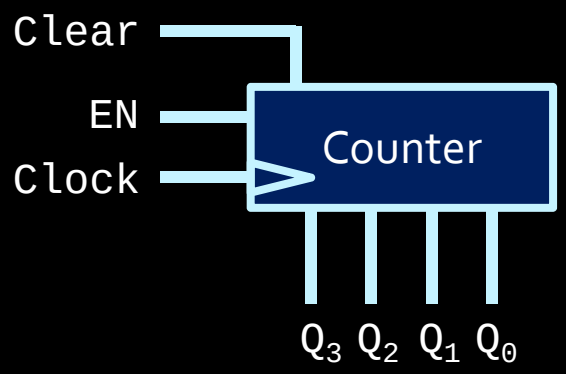
- Imagine you have access to a 4-bit register.



- What does the `Write` signal do?

Question #2

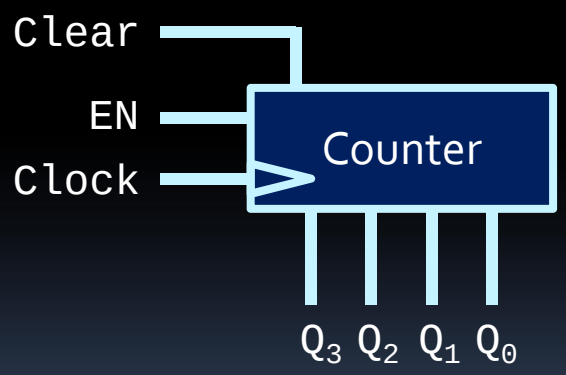
- Assume that you have access to a counter circuit:



- How do you make a signal that goes high after 10 clock cycles?
- How do you make a signal that goes high every 10 clock cycles?

Question #2 (cont'd)

- How do you make a signal that goes high every 100 clock cycles, only using the 4-bit counter below (and a few additional gates)?



Question #3

- How many flip-flops would you need to implement the following finite state machine (FSM)?
  - 11 states
  - # flip-flops = $\lceil \log_2 (\text{\# of states}) \rceil$
  - # flip-flops = 4

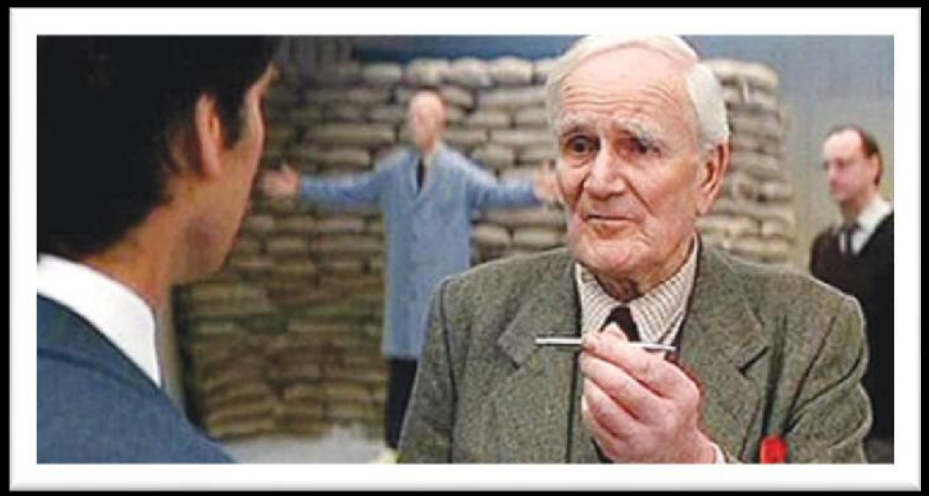
Question #4

- How would we make the following Finite State Machine?

Exploding pen continued…

Making the James Bond pen

- Pen starts off in disarmed state.
- When clicked three times, pen arms itself.



- When clicked three more times, pen disarms itself.
- What are the steps to making this circuit?

Reminder: How to FSM

- As a brief reminder:
  1. Draw state diagram
  2. Derive state table from state diagram
  3. Assign flip-flop configuration to each state
     - Number of flip-flops needed is: $\lceil \log(\#\text{ of states}) \rceil$
  4. Redraw state table with flip-flop values
  5. Derive combinational circuit for output and for each flip-flop input.