1. Examples handout questions 15, 16, 17, 18, 19, 20

2. Draw a state machine that takes in a sequence of bits at its input IN and outputs 1 if the number of 1's it has seen is even, 0 otherwise. Also, if the machine ever encounters the bit sequence 1001, it should output 0 regardless of the input, Note: you don't need to actually implement the logic for this state machine.

3. Design a 3 flip-flop counter that transitions through states $Q_2Q_1Q_0 = 000$, 100, 110, 111, 011, 001 and then repeats.

   (a) Draw a state diagram and state transition table for this counter.

   (b) Derive the next-state functions in product-of-sums form.

   (c) Is your counter self starting? Justify your answer. If not, change it to make it self starting.

4. Flip-flops sometimes have an additional input called *Clear*. If the *Clear* input is asserted at any time, the output of the flip-flop will immediately be set to 0 and will stay this way until the falling edge of the clock causes it to latch a new input. Modify the Master-Slave D flip-flop circuit to implement this *Clear* function.