Tutorial 8
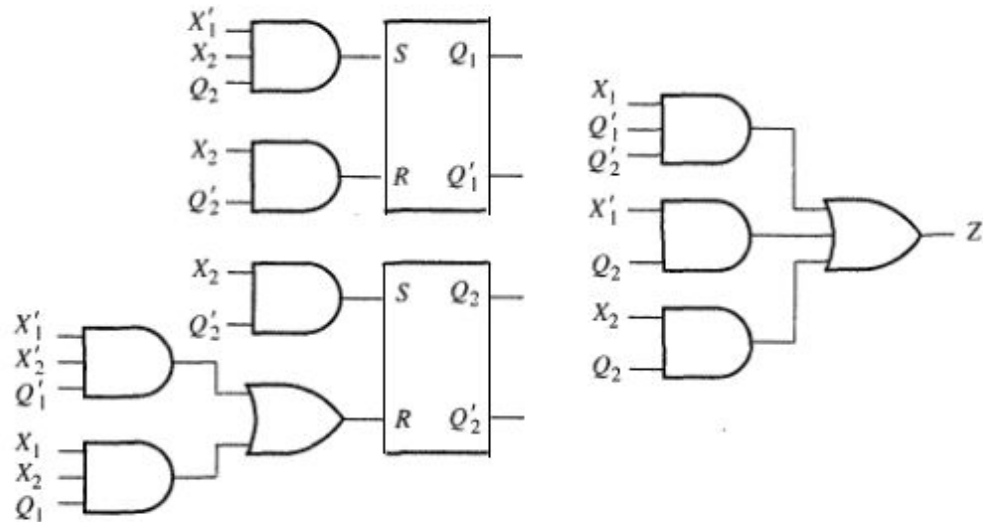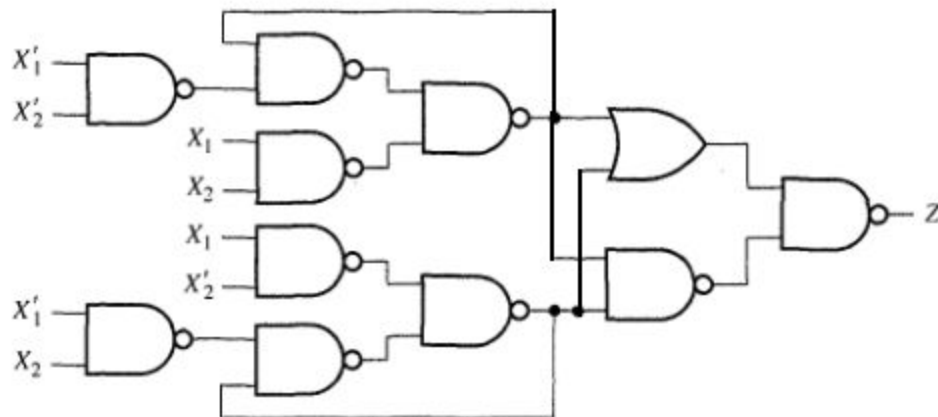
1) For the following network, construct a flow table and determine the output sequence. The initial state is 00 and the input sequence is X_1X_2 = 00, 01, 11, 10, 00.

2) Analyze the following network using a flow table. What is the output sequence for the following input sequence: X_1X_2 = 00, 10, 11, 01, 11, 10, 00, 01, 00? Indicate transients, if any, in parentheses.


3) (a) Analyze the following asynchronous network using a flow table. Starting in the stable total state for which X = Z = 0, determine the state and output sequences when the input sequence is X = 0, 1, 0, 1, 0, 1 ...

(b) Are there any races in the flow table? If so, are they critical races?
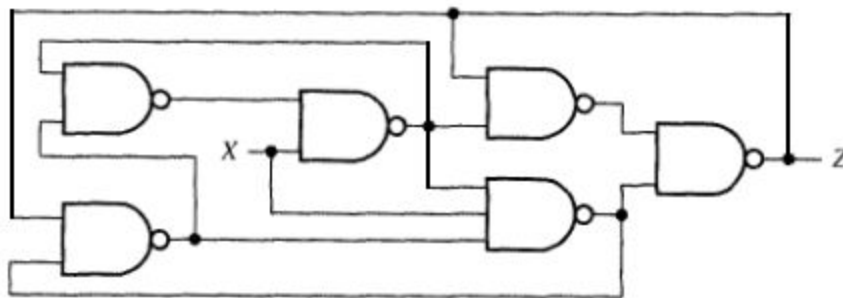
4) For the following SM chart

a) Use the state assignment S0: $AB = 00$; S1: $AB = 01$; S2: $AB = 10$. Derive the next state and output equations by tracing link paths. Simplify these equations using the don't care state ($AB = 11$).

b) Realize the chart using a PLA and D flip-flops. Give the PLA table.

c) If a ROM is used instead of a PLA, what size ROM is required? Give the first five rows of the ROM table.
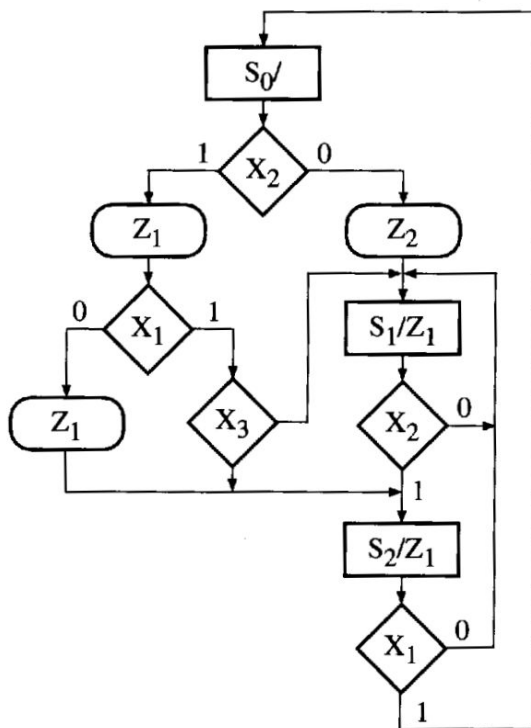
5)

The following SM chart is to be realized using a PLA, a 4-to-1 MUX, and a 3-bit binary counter (similar to a 74163).

(a) Draw a block diagram of the system.

(b) Make a suitable state assignment. Indicate any necessary changes on the SM chart.

(c) Give the PLA table.

```
                    ┌──────────┐
                    │  S0 /Z1  │
                    └────┬─────┘
                         │
                     ╱X1╲ ──────1──────→ ┌──────────┐
                     ╲  ╱                 │ S3 /Z1 Z2│
                      │0                  └────┬─────┘
                      ▼                        │
                 ┌────────┐ ←──1──  ╱X2╲ ──────┘
                 │ S1/Z2  │          ╲  ╱
                 └───┬────┘           │0
                     │                ▼
                  ╱X1╲ ────1────→ ┌────────┐
                  ╲  ╱            │ S4 /Z2 │
                   │0             └───┬────┘
                   ▼                  │
               ┌────────┐ ←──1── ╱X3╲─┘
               │ S2/Z1  │         ╲  ╱
               └───┬────┘          │0
                   │               ▼
            0    ╱X3╲ ───1───→ ┌──────────┐
          ←──────╲  ╱          │ S5 /Z1 Z2│←──┐
                                └────┬─────┘   │
                                     │         │
                            0    ╱X3╲──────1───┘
                          ←──────╲  ╱
```