Problem 1:

The sensors for the 2, 3, 5, and 7 kW motors are S1, S2, S3, and S4, respectively. The collective logic operation of the sensor outputs are written under the column P. The truth table is set up as follows.

S1	S2	S3	S4	P
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

The Karnaugh's Map is as follows.

		S_3S_4			
		00	**01**	**11**	**10**
S_1S_2	**00**	0	1	1	0
	01	0	1	1	1
	11	0	1	1	1
	10	0	1	1	1

Problem 1

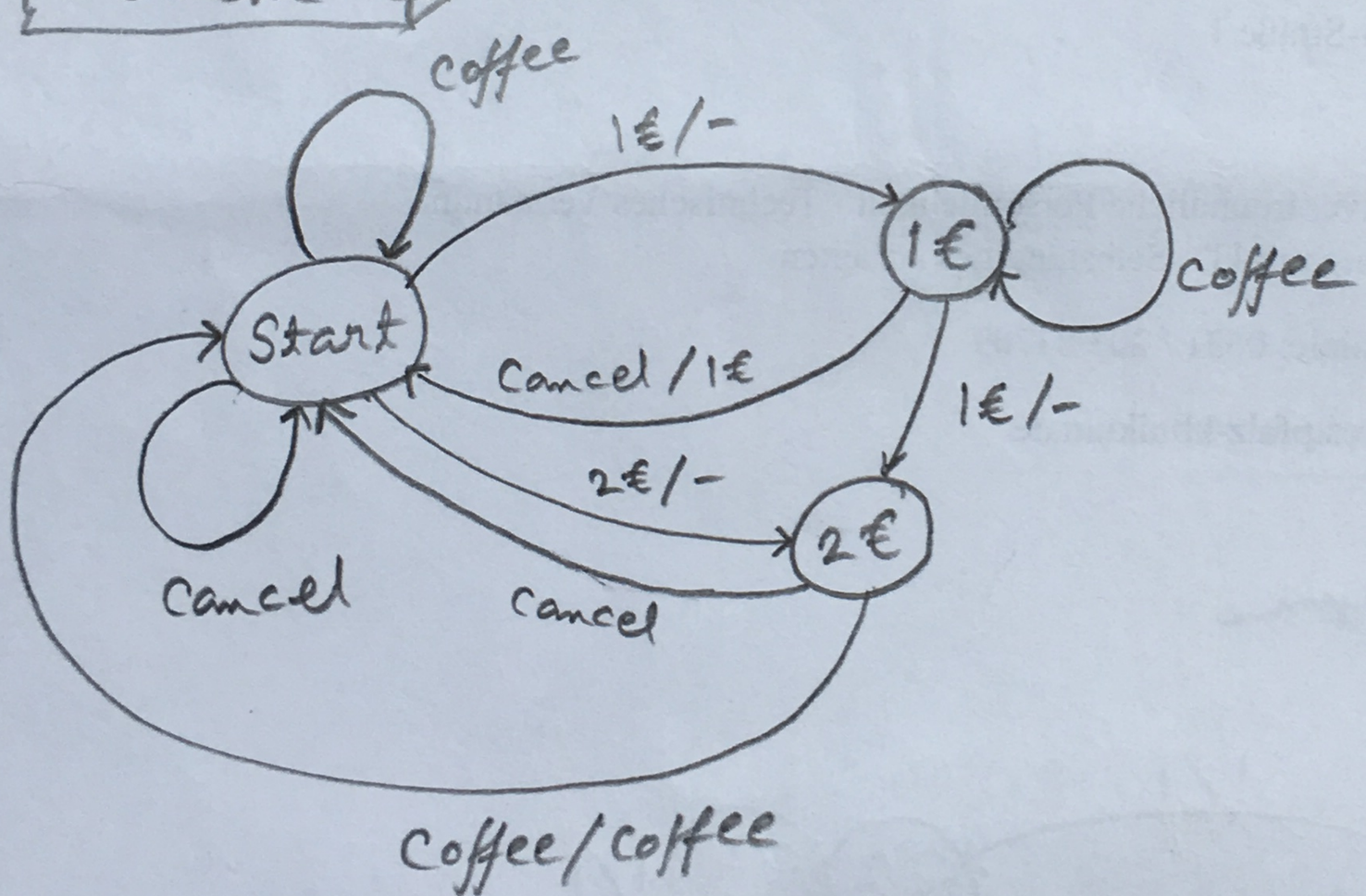
The DNF is derived as follows:

$$(\bar{S}_1\ \bar{S}_2\ \bar{S}_3 S_4) \vee (\bar{S}_1\ \bar{S}_2 S_3\ S_4) \vee (\bar{S}_1\ S_2\ \bar{S}_3 S_4) \vee (\bar{S}_1\ S_2 S_3\ \bar{S}_4)$$
$$\vee (\bar{S}_1 S_2 S_3 S_4) \vee (S_1\ \bar{S}_2\ \bar{S}_3\ S_4) \vee (S_1\ \bar{S}_2 S_3\ S_4) \vee (S_1 S_2\ \bar{S}_3\ S_4)$$
$$\vee (S_1 S_2 S_3\ \bar{S}_4)$$

From karnaugh's Map the DNF is

$$S_4 \vee (S_2 S_3) \vee (S_1 S_3)$$

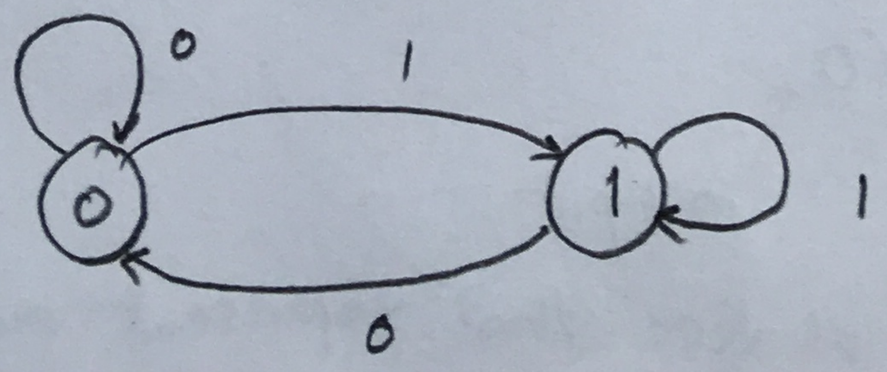
Problem 2



- → No output.

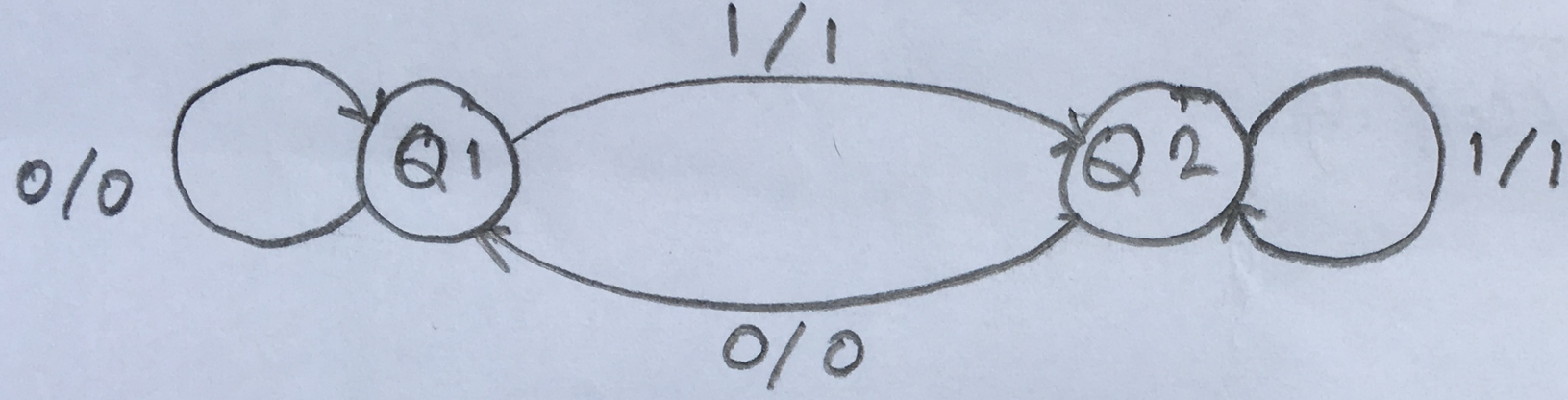
Problem 3

Moore Automaton

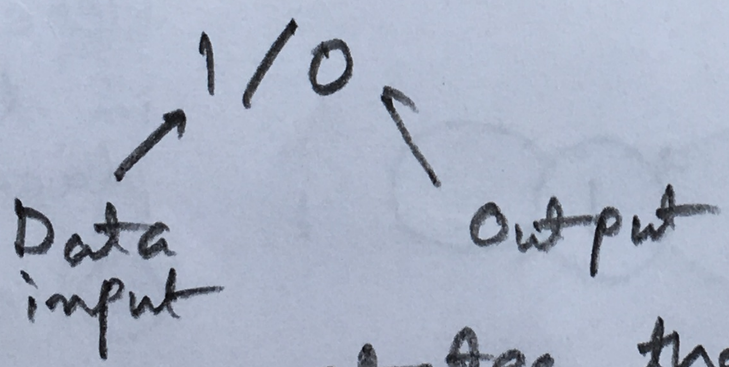


Here 1 and 0 in the state places (i.e. (1) and (0)) are clock transitions.

Mealy Automaton



Here the arrow is the transition with following denotation.



Q1 and Q2 are states that represent output data stored.

Problem 4