Tutorial 7
Problems of Combinational Logic

Exercise 1 Polling Report

Four shop stewards (*A*, *B*, *C*, *D*) represent the following number of votes respectively: 100 votes, 150 votes, 250 votes and 175 votes. A proposal needs at least 50 % of the votes to be accepted. Write down the most simplified expression of a logic function (*S*) that is 1 when a proposal is accepted and 0 when it is rejected. Draw the circuit diagram.

Indication: '*A* = 1' means that the A shop steward accepts a proposal and '*A* = 0' means that he or she rejects it. The same goes for the other shop stewards.

Exercise 2 Liquid Level

Let us consider two tanks: *R1* and *R2*. The liquid level of each tank is checked by two sensors: a high-level sensor (*A* for *R1*, *B* for *R2*) and a low-level sensor (*C* for *R1*, *D* for *R2*). The values of *A*, *B*, *C*, *D* are 1s when there is some liquid in front of the sensor; otherwise they are 0s. Three indicator lights (*V1*, *V2*, *V3*) are set according to the following conditions:

- *V1* = 1, if *R1* and *R2* are full.
- *V2* = 1, if *R1* and *R2* are empty.
- *V3* = 1, in any other cases.

Write down the truth tables and the most simplified expressions of the outputs. Draw the circuit diagram.