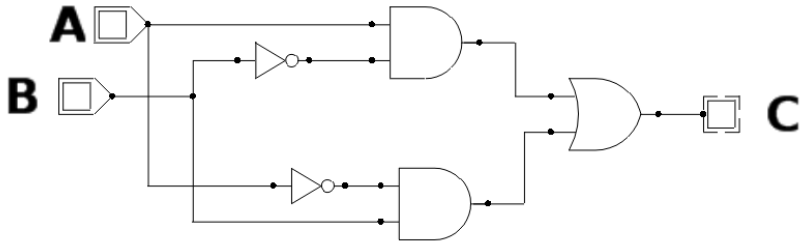
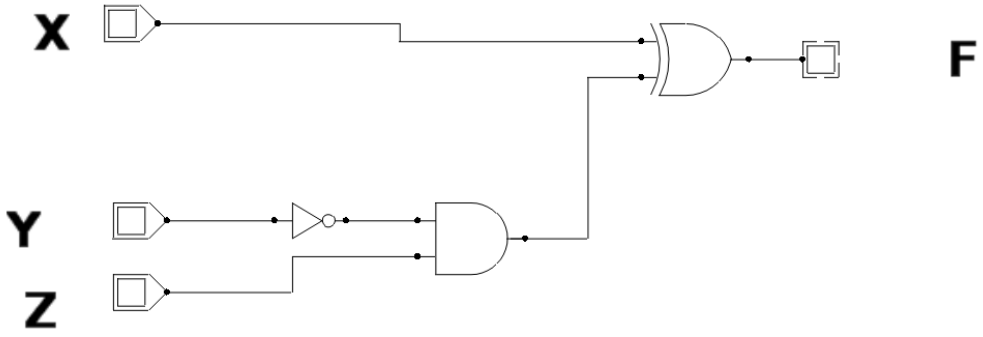
Questions for Breakout Group Discussions: 5 (+1) questions.

- Ques.1 (circuit from Set 1 Page 6)

(a) What is the boolean function for this circuit



(b) What is the boolean function F



Questions for Breakout discussions

- Ques.2: Draw logic circuit to implement the function:
  - F= (A AND (B XOR C) OR (NOT C))
  - Draw by hand first, then implement in simulator later.

- Ques 3: Design circuit for truth table shown here
  - (a) Derive function and (b) draw circuit by hand first
    - Implement in simulator later

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

Truth Table for Question 3

4. Logic control for overhead light

- 4. Design logic for light switch in a room based on the position of two switches – switches are at two different entrances to the room and either switch should be able to change the state (on/off) of the light independently.
  - If both switches are in the “down” position (represented by 0) the light must be off (represented by 0)
  - No matter what position the switches are in or the current state of the light, flipping either switch must change the state of the light.

  - Derive truth table
  - Design circuit, Derive Boolean function

5. Transporting a wolf, a goat, cabbage across the river (!!)

- There is an old puzzle in which a farmer F must transport a wolf W, a goat G, and a cabbage C across a river. However, the farmer can only transport one of W, G, or C across the river at a time, and if left together and unattended, the goat will eat the cabbage and the wolf will eat the goat.
- Let F=0 indicate the presence of the farmer on the west bank of the river and F=1 indicate presence on the east bank. Use similar definitions for W, G, and C.
- Derive a truth table for a function D which outputs 1 if the farmer is in danger of losing the goat or the cabbage (and outputs D=0 if there is no danger of this happening).
  - You may assume that a trip across the river can be made instantaneously, so that if an item (or farmer) is not on one side of the river it must be on the other side.
- From truth table, determine the Boolean function for D and a circuit to implement D

6. Boolean function for Addition

- Find Boolean function that computes the sum and carry) of three inputs: two 1-bit numbers A,B and a carry-in bit.
- Outputs S, C-out
- Input A, B, C-in