# COMP.CE.200 Digital Design

## Fall 2021

## Paper Exercise 2

### Problem 1

A car cabin light switch has three settings: ON, DOOR, and OFF.

Switch settings: ON = light is on, OFF = light is off, DOOR = light is on if at least one of the four doors is open.

The switch signals have been connected as follows:

OFF => Switch = "001",

ON => Switch = "010",

DOOR => Switch = "100".

The switch is ideal (one-hot), i.e., only one bit can be '1' at a time. This means that you do not have to worry about what happens when the switch is changing state.

The block has one output that controls the light (Light = '1' => the light is on; Light = '0' => the light is off).

Input signal names [and their widths]: Switch[2:0], DoorOpen[3:0]
Output signal name: Light (1 bit)

Design the combinational logic for the block that implements this specification. Use only AND, OR, and NOT gates with at most 2 inputs.

Hint: use "don't care" states in the inputs where appropriate when drawing a truth table.