EE 2000 Logic Circuit
Design Semester A 2021/22

Tutorial 3

1. Use a truth table to present (A + B + C +D)' = A' B' C' D'

2. Implement the following expression with **2-input NAND gates** only:
   (a) *ABC + DE*
   (b) *ABC + D' + E*

3. Given a truth table:

a	*b*	*c*	*d*	*f*
0	0	0	0	0
0	0	0	1	0
0	0	1	0	X
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	X
0	1	1	1	X
1	0	0	0	0
1	0	0	1	X
1	0	1	0	1
1	0	1	1	0
1	1	0	0	X
1	1	0	1	0
1	1	1	0	X
1	1	1	1	0

   (a) Express *f* as product of maxterms function in numeric form.

   (b) Find its MPS form using K-map.

   (c) From the answer of (b), please design a logic circuit by NAND gates only.

4. Design a combinational circuit for a 3-bit Binary-to-Gray code converter.

5. Joe, Jack, and Jim get together once a week to either go to a movie or go bowling. To decide what to do, they vote and a simple majority wins. Assuming a vote for the movie is represent as a 1, design a NAND gate circuit that automatically computes the decision.