

EE1001 - Tutorial 3

1. Using AND, OR, NOT gates to draw the logic circuit diagram of the Boolean function $f(x, y, z) = y'(x + z' + y')(x' + z')$. The diagram should correspond exactly to the equation. Assume that the complements of the inputs are not available.
2. Proof $(A+B'C)' = A'(B+C')$ with truth table.
3. Simplify the Boolean expression $(A+B)(A+C)$.
4. For the following logic functions, find all the minterms and maxterms for each them and express them in canonical POS and SOP forms.
 - (a) $f(x,y,z) = xy'z' + yz + x'z'$
 - (b) $f(x,y,z) = xz' + x'y + xz + yz'$
 - (c) $F(A,B,C,D) = A'(B+CD) + B'C+B(A+C)$
5. For the following logic functions, list all the minterms and maxterms for each of them.
 - (a) $f(x,y,z) = \sum m(1,2,7)$
 - (b) $f(w,x,y,z) = \sum m(0,3,4,8,10,12,13)$
 - (c) $f(a,b,c) = \prod M(1,6)$
6. Using DeMorgan's theorem, convert the following Boolean expressions to equivalent expressions that can be implemented with (i) NAND gates only, and (ii) NOR gates only. Draw the circuits.

$$(a) \quad f = \overline{\overline{x}y + \overline{x}yz + y\overline{z}} = \overline{(x'y)(x'yz)(yz')}$$

$$(b) \quad f = (x + \overline{y})(\overline{x} + \overline{y} + z)(y + \overline{z})$$
7. Find the Boolean function of the following function F(A,B,C) in SOP form.

