L2 practice problems

Algebraic simplification with Boolean theorems

1. Tocci et al 10th ed Q3-24(a)

Simplify the following expression using the theorems that follow.

$x = (M + N)(M' + P)(N' + P')$

Theorems :-

$x \cdot x = x$
$x \cdot x' = 0$
$(w + x)(y + z) = wy + xy + wz + xz$

2. Tocci et al 10th ed Q3-24(b)

Simplify the following expression using the theorems that follow.

$Z = A'BC' + ABC' + BC'D$

Theorems :-

$x(y + z) = xy + xz$
$x + x' = 1$
$x + 1 = 1$

3. Simplify each of the expressions using DeMorgan's theorem. (Tocci et al 10th ed Q3-26)

[a] (A'BC')'
[b] (A'+B'C)'
[c] (ABC'D)'
[d] (A+B')'
[e] (A'B')'
[f] (A'+C'+D')'
[g] (A(B+C')'D)'
[h] ((M+N')(M'+N))'
[i] (((AB)'C)'D)'

4. Draw the logic circuit diagram for each Boolean expression below using NAND and NOR symbols where suitable.

(a) X = [(A+B)'(B'C)]'

(b) X = [(ABC)'(A+D)]'