Lab 4-Boolean Algebra

1. Use truth tables to prove the following Boolean statements.

1. $x.(x + y) = x$
2. $x.(x' + y) = x.y$
3. $(x + y)' = x'y'$
4. $(xy)' = x' + y'$

2. Use truth tables to prove or disprove the following Boolean statements. Note, however, that some of these Boolean statements are **NOT** true.

5. $(x + y')(x + y) = x$
6. $xy + x'z + yz = xy + x'z$
7. $(xyz' + x'yz)' = xz + y' + x'z'$
8. $(x + y + z)(x + y' + z') = x + yz' + zy'$
9. $(x'yz')'\,(xy'z')' = z + xy + x'y'$
10. $(x' + y + z)(x + y'z') = xy + zy'$
11. $(x + (xy')')(x' + yz)' = xz' + xy'$

3. Simplify the following by using theorems and laws. Show all the work the same way as we do in class:

1. $xy + xy' + x$
2. $(x + y)(x + y')$
3. $abc + abc' + a'bc + a'bc'$
4. $abc' + ab'c + ab'c' + a'bc'$
5. $y' + xy$
6. $x + y'z' + z$
7. $(x' + z')(xz + y')'(x + y + z')$

4. Prove by using the rules and theorems:

$$ab + b + (a' + b)' = a + b$$

$$ab' + a(b' + c)' = a(bc)'$$

$$(x + yz)' + (x + x'z')' = x'$$

$$abc' + c = ab + c$$