 

**Advanced Placement Computer Science**

**Unit 1: Number Systems, Bases, DM Law**

Lesson: Logical Operators and DeMorgan’s Law

*Last Updated: 9/23/2013*

You will recall the logical operators:

**And = &&  
Or = ||  
Not = !**

DeMorgan did research in logic systems and came up with this law

**=** and  **=**

These can be quite useful when trying to find equivalent logical expressions for boolean expressions

Example 1:

I will go to work if : my car runs and I am not sick.

Transform my conditions for going to work using DeMorgan’s Law;

**I will NOT go to work if: my car does NOT run or I am sick.**

3 easy steps to using DeMorgan’s Law

1. **Invert whole expression**
2. **Change the lowest precedence signs**
3. **Invert individual terms**

Note: AND becomes **Or** Or becomes **And** NOT becomes **Uninverted**

Example 2: **)**

**!A || B**

Example 3:   
**!!(!A && !(!B&&C))**  
**(!A && (B||!C))**

NOTE: **Negation alters all of the operators inside ( )**  
  
  
  
Example 4:

**!!(!(A<B) || !(C>D))**

**A>=B || C<=D**