ECE 474a/574a – Computer-Aided Logic Design
Exam 2 Notes

Boolean Algebra			
Commutative a + b = b + a a * b = b * a	*Distributive* a * (b + c) = a*b + a*c a + (b * c) = (a + b) * (a + c)	*Associative* (a + b) + c = a + (b + c) (a * b) * c = a * (b * c)	*Identity* 0 + a = a + 0 = a 1 * a = a * 1 = a
Complement a + a' = 1 a * a' = 0	*Null Elements* a + 1 = 1 a * 0 = 0	*Idempotent Law* a + a = a a * a = a	*Involution* (a')' = a

*** you should know DeMorgan's Law*

Convert SOP function to Complete Sum Methodology

1. Start with arbitrary SOP form
2. Add consensus pair of all terms not contained in any other term
3. Compare new terms with existing and among other new terms to see if any new consensus terms can be generated
4. Remove all terms contained in some other term

Repeat until no change occurs

$CS(f) = ABS([x_1 + CS(f(0, x_2, \ldots, x_n))] \cdot [x_1' + CS(f(1, x_2, \ldots, x_n))])$

```
CLIQUE_PARTITION( G(v, e) ){
    Π= ∅
    while( G(v,e) not empty ) do {
        C = MAX_CLIQUE( G(v,e) )
        Π = Π ∪ C
        delete C from G(v,e)
    }
}
```

```
MAX_CLIQUE( G(v, e) ){
    C = vertex with largest degree
    repeat {
        repeat {
            U = { v ∈ V : v ∉ C and adjacent to all vertices of C}
            if ( U ≠ ∅ ){
                return C
            }
            else{
                select v ∈ U
                C = C ∪ v
            }
        }
    }
}
```

```
VERTEX_COLOR ( G(v, e) ){
    for( i=1 to | V | ){
    C = 1
    while( there exists a vertex adjacent to v_i with color c) do {
        C = C + 1
    }
    label v_i with C
    }
}
```

```
LEFT_EDGE( I ){
    L = sort(I) in ascending order to l_j
    c = 0
    while( L not empty ) {
        S = ∅
        r = 0
        while ( ∃ an s : s ∈ L and s is first element in L with l_s ≥ r ) {
            S = S ∪ {s}
            r = r_s
            remove s from L
        }
        c = c + 1
        label elements of S with color c
    }
}
```