PRACTICE PROBLEM SET 8
Branch and Bound

1. Using the MIS_QUICK algorithm, find the size of the maximally independent set.
   (a) Base your weights on row counts
   (b) Base your weights on column counts

Fig 1. Constraint matrix for problem 1.

	P1	P2	P3	P4	P5	P6	P7
m0		x		x	x		
m1	x		x			x	
m2		x				x	x
m5	x						x
m7		x		x			x

2. What is a local search? What are the benefits and drawbacks of a local search.

3. What is the cooling schedule in simulated annealing used for? What is the purpose of different cooling schedules?

4. Using the branch and bound algorithm, find the minimum cover for the constraint matrix in Fig 2.

Fig 2. Constraint matrix for problem 4.

	P1	P2	P3	P4	P5	P6	P7	P8
m0	**x**							**x**
m2							**x**	**x**
m3						**x**	**x**	
m7					**x**	**x**		
m8	**x**	**x**						
m12		**x**	**x**					
m13			**x**	**x**				
m15				**x**	**x**			

5. Find the minimum cover for the constraint matrix in Fig 3 using a decision tree and the branch and bound algorithm. How much of the search space can be eliminate by using the branch and bound algorithm?

Fig 3. Constraint matrix for problem 5.

	P1	P2	P3	P4
m7	x		x	
m13		x		x
m15			x	x

6. Use Simulated Annealing to find the minimum cover for constraint matrix in Fig 4. Assume you are using a linear cooling schedule where the start temperature is initialized to 100 and decrease by 20 after each iteration. Assume the random numbers generated in each iteration are $r_0 = 0.215$, $r_1 = 0.920$, $r_2 = 0.150$, $r_3 = 0.689$, $r_4 = 0.678$, $r_5 = 0.752$, $r_6 = 0.112$, $r_7 = 0.995$, $r_8 = 0.332$. You may choose the random neighbor selected in each iteration of the algorithm.

Fig 4. Constraint matrix for problem 6.

	P1	P2	P3	P4	P5	P6	P7
m0		x		x	x		
m1	x		x			x	
m2		x				x	x
m5	x						x
m7		x		x			x