T-79.4201 **Autumn 2006**
Search Problems and Algorithms
Tutorial 10, 30 November
Problems

1. Suppose you were designing a Genetic Algorithm for solving (a) the MAX CUT problem, (b) the MIN VERTEX COVER problem. (Cf. Tutorial 2.) What would you choose as the individuals ("chromosomes") in the algorithm, and what would be the objective fuction? How would you perform recombination ("crossover") of the individuals?

2. Suppose you were designing a Genetic Algorithm for solving the MIN TSP problem. What would you choose as the individuals ("chromosomes") in the algorithm, and what would be the objective fuction? How would you perform recombination ("crossover") of the individuals?

3. Verify the claim that if $m(H, p)$ denotes the number of individuals sampling schema H in population p, and $f(H, p)$ denotes the average fitness of schema H in population p, then the expected number of individuals sampling schema H after a proportional selection operation $\sigma(p)$ (say, roulette-wheel selection) satisfies:
$$E[m(H, \sigma(p))] = m(H, p) \cdot f(H, p).$$

4. Outline a Coevolutionary Genetic Algorithm for minimising the size of a Boolean circuit. (Thus, the input is a Boolean circuit, and the goal is to find an equivalent cicruit with as few gates as possible.)