

## 1996 Paper 5 Question 11

### Complexity Theory

- (a) Show that the problem 3-SAT is at least as hard to solve as n-SAT. [5 marks]
- (b) Show that the task of finding a minimum cost closed circuit in a weighted directed graph (a Travelling Salesman Problem of the minimization variety) is at least as hard as the Hamiltonian Circuit Problem. [5 marks]
- (c) Show that the class NP-complete is contained in the class P-space. [5 marks]
- (d) Show that the class P-space is contained in the class EXP-time. [5 marks]

In each case ensure that your answer makes it clear what the problems and classes involved are. Standard results do not need to be proved provided they are clearly stated.