2 Complexity Theory (AD)

(*a*) State precisely what it means for a language (*i*) to be co-NP-complete, (*ii*) to be in NL and (*iii*) to be in PSPACE. [6 marks]

(*b*) Consider the following two decision problems.

Problem 1: Given an undirected graph $G = (V, E)$ with $|V|$ even, does G contain a clique with at least $|V|/2$ vertices?

Problem 2: Given an undirected graph $G = (V, E)$, does G contain a clique with at least $|V| - 3$ vertices?

(*i*) Which of the two problems is in P and which one is NP−complete? [2 marks]

(*ii*) For the problem in P, describe a polynomial-time algorithm. [4 marks]

(*iii*) For the other problem, prove that it is NP-complete. [8 marks]