2 Complexity Theory (AD)

(a) Give precise definitions of each of the following complexity classes:

(i) $P$;

(ii) $L$; and

(iii) $NL$.

[3 x 2 marks]

(b) State the Space Hierarchy Theorem. [2 marks]

(c) For the purposes of this question, let $L_2$ denote the complexity class $SPACE((\log n)^2)$.

For each of the following inclusions between complexity classes, state whether it is true, false or unknown, giving full justification for your answer.

(i) $L \subseteq L_2$;

(ii) $L_2 \subseteq L$;

(iii) $L_2 \subseteq P$; and

(iv) $NL \subseteq L_2$.

[4 x 3 marks]