Complexity Theory
Easter 2000
Suggested Exercises 2

1. Consider the algorithm presented in the lecture which establishes that $\mathsf{Reachability}$ is in $\mathsf{SPACE}((\log n)^2)$. What is the time complexity of this algorithm?
Can you generalise the time bound to the entire complexity class? That is, give a class of functions F, such that

$$\mathsf{SPACE}((\log n)^2) \subseteq \bigcup_{f \in F} \mathsf{TIME}(f)$$

2. Show that, if $\mathsf{SPACE}((\log n)^2) \subseteq \mathsf{P}$, then $\mathsf{L} \neq \mathsf{P}$. (Hint: use the Space Hierarchy Theorem from Exercise sheet 1.)

3. Show that if $\mathsf{Reachability}$ is in L, then $\mathsf{L} = \mathsf{NL}$.