Problem Set 9—Not Due

1. Exercise 36.5–2 (p. 960).
2. Exercise 36.5–4 (p. 960).
3. A graph $G = (V, E)$ is said to be *k-colorable* if there is a way to paint its vertices using colors in $\{1, 2, \ldots, k\}$ such that no adjacent vertices are painted the same color. When k is a number, by kCOLOR we denote the language of (encodings of) k-colorable graphs. The language 3COLOR is NP-Complete. (You can assume this.) Use this to prove that the language 4COLOR is NP-Complete, too.
4. Suppose that someone gives you a polynomial-time algorithm for deciding LP: on input of a weighted graph G and a number B, the algorithm says if G has a (simple) path of weight $\geq B$. Describe how to use this algorithm to find a longest-path in G. Afterwards, count up how many calls to the LP subroutine you made. Is it possible to make do with a single call? Give convincing evidence to support your answer.