Problem Set 2: Problems 5–8. Due Tuesday, Jan 31, 2006

Problem 5. Papadimitriou, pp. 66–67, problem 3.4.2 parts (a)–(e).

Problem 6. Papadimitriou, pp. 85, problem 4.4.10.

Problem 7. Papadimitriou, pp. 119, problem 5.8.10.

Problem 8. At some point you may have seen a description of the *tiling problem* and a proof of its undecidability. Recall that in the tiling problem you are given a finite set T of *tile types*. Each tile type is a four-tuple of number (a, b, c, d) specifying the colors of the left, top, bottom, and right edges. The question in TILING is as follows: is there a tiling of the upper-right quadrant of the plane that uses 1 cm $\times$ 1 cm tiles of the specified types where adjacent edges have the same color? (Often, for simplicity, one further demands that a particular tile be laid down at the origin.) At some point in your long career, you may well have seen a proof of the undecidability of the tiling problem (a pretty easy reduction from the complement of the halting problem). Such a proof shows that TILING is not r.e.. But is it co-r.e.? Prove your answer.