Problems 5–8. Due Tuesday, May 5, 1998

There are some pretty challenging problems here!

Problem 5. The proof of the undecidability of the Tiling problem shows that it is not r.e.. Is it co-r.e.? Prove your answer.

Problem 6. Let $A = \{\langle M \rangle : L(M) = (L(M))^R\}$. (Recall that $\cdot^R$ is the "reversal operator"; for x a string, x^R is x written backwards; and for L a language, L^R extends this pointwise.) Show that A is neither r.e. nor co-r.e..

Problem 7. Show that $\{\langle G \rangle : G$ is a CFG and $L(G)$ is accepted by some DPDA$\}$ is undecidable. (Too bad for the compiler-tools people.)

Problem 8. Prove that there exists Turing-incomparable languages A and B: $A \not\leq_{\mathrm{T}} B$ and $B \not\leq_{\mathrm{T}} A$.