

Recursion Theory – First semester; 2004/2005
Homework set #7 – DUE TUESDAY NOV 2
(leave your homework in my mailbox)

1. **Problem 1:** For each e , let M_e denote the Turing-machine with code e . We say that the Turing machines M_x and M_y are equivalent (notation: $M_x \cong M_y$) if they compute the same function.
Show that the machine-equivalence problem is unsolvable, that is, the set $\{(x, y) \mid M_x \cong M_y\}$ is not computable.

2. **Problem 2:** While talking about the Busy Beaver function, we proved an easy showing that every recursive function is dominated by an increasing recursive function. Prove the following more interesting result: if g is a recursive function (in one variable) which is one-to-one and has recursive range, then the range of any recursive function f that dominates g is also recursive.

3. **Problem 3:** Prove that the set $C = \{x \mid \exists y(x \in W_y \text{ and } y \in W_x)\}$ is creative.