

COSC 4111 3.0—Fall 2002

Posted: Nov 18, 2002

Due: End of term (before exams) [Exact date TBA]

Problem Set No. 3

- (1) Do problem #25, p.126 *without using* the normal form theorems.
- (2) Without using Rice's theorem, show that the set $A = \{x : \text{ran}(\phi_x) \text{ has exactly three elements}\}$ is not recursive. (I.e., " $x \in A$ is unsolvable").
- (3) Is the "proof" below correct? If not, where exactly does it go wrong?
"Let $y = f(\vec{x}_n)$ be r.e. Then $y = f(\vec{x}_n) \equiv \psi(y, \vec{x}_n) = 0$ for some $\psi \in \mathcal{P}$. Thus $g = \lambda \vec{x}_n. (\mu y) \psi(y, \vec{x}_n)$ is in \mathcal{P} . But $g = f$, since the unbounded search finds the y that makes $y = f(\vec{x}_n)$ true, if $f(\vec{x}_n) \downarrow$. Thus, $f \in \mathcal{P}$."
- (4) **Ch.7.** #3 parts (1) and (2) only.