Problem Set No. 2

Dept. of Computer Science

Date: Nov. 10, 2002
Due: TBA

1. Do Ch. 7 problems 3 and 7.

2. Without using Rice's theorem, show that the set $A = \{x : 3 \in \mathrm{ran}(\phi_x)\}$ 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. Chapter 8, problem 7 (*Hint.* No. Use the Ackermann function to show why not).

5. Chapter 13, problems 1, 7, 23, 26, 27, 48.