Assignment 2 **CAS776 Fall 2002** **due on October 31**

1. Prove Theorem 2.3 in the textbook: Let L be a language is $\mathbf{SPACE}(f(n))$. Then, for any $\varepsilon > 0$, $L \in \mathbf{SPACE}(2 + \varepsilon f(n))$.

2. Prove (b),(c),(d) in Proposition 3.2 in the textbook: show that the following languages are not recursive:

$$\{M; x : \text{ there is a } y \text{ such that } M(x) = y\ \}$$
$$\{M; x : \text{ the computation } M \text{ on input } x \text{ uses all states of } M\ \}$$
$$\{M; x; y : \ M(x) = y\ \}$$

3. Problem **4.4.11** in the textbook.

4. Problem **4.4.13** in the textbook.