homework 7

cs201.1 **due 24 march 1999**

real problems

1. Prove or disprove that the following relations are equivalence relations. (The domain and co-domain here are the set of real numbers.)

a) $aRb \Leftrightarrow \lfloor a \rfloor = \lfloor b \rfloor$

b) $aRb \Leftrightarrow |a - b| < 0.1$

c) $(a, b)R(c, d) \Leftrightarrow ac = bd$

2. What is the smallest equivalence relation R over the set $A = \{1, 2, 3, 4, 5, 6\}$ such that $1R2$, $4R5$, and $5R3$?

3. How many different equivalence relations are there over the set $A = \{1, 2, 3, 4\}$?

4. In the following to cases, f is a function over the real numbers.

a) Prove that for any such f,the relation R_f defined by $nR_fm \Leftrightarrow f(n) = f(m)$ is an equivalence relation.

b) If we let f be the sine function (i.e. $f(x) = \sin x$) what is the partition generated from R_f?

c) Could you use this result to simplify your work in problem 1?