CSE 322 **Fall 1999**

Homework 1

Due Wednesday, October 6, 1999

If you encounter terms whose meaning you don't know or no longer remember, look them up in chapter 0 of your text. For proof techniques, use section 0.4. There are however no recipes for finding proofs! Be creative and enjoy!

1. Read chapter 0 of text.
2. [10 points] Problem 0.10 from text.
3. [10 points] Consider the set S of all n-bit binary numbers. Define a binary relation R on S as follows: aRb if a and b differ in a single bit. Is this relation reflexive? Is it symmetric? Is it transitive? Briefly explain your answer in each case.
4. [15 points] For any set S consisting of 12 elements in the range 1 to 300 show that there exist two disjoint subsets A and B of S whose elements sum to the same number.
5. [15 points] A tree is called a **strict** t-ary tree if every node is either a leaf or has exactly t children. Show that the number of leaves in a strict t-ary tree is $(t-1)$ times the number of internal nodes plus one.
6. (Don't **have** to turn this one in) Let T be a binary tree in which every internal node has exactly two children. Let T have n leaves. Show that there is a node A of T such that the subtree rooted at A has p leaves, where $\frac{n}{3} \leq p < \frac{2n}{3}$.