University of Central Florida
School of Computer Science
COT 4210 Fall 2004

Prof. Rene Peralta
Homework 1

Due date: Aug. 30

1. check the course web site at
   http://www.cs.ucf.edu/courses/cot4210/fall04/
   and send mail to the TA with

   - Your name;
   - your preferred email address;
   - your major and year.

2. Page 27, Problem 0.10. Please be precise and concise.

3. Page 27, Consider the proof of problem 0.11. Find the first incorrect statement (i.e. a statement that it is neither an assumption nor does it follow from previous statements). Give a counterexample that shows the statement is not always true.

4. Page 27, Problem 0.13.

5. It is actually not true that an anual interest rate I is the same as a monthly rate of $I/12$. If it was true you could do the following (assume an anual rate of 12 percent):

   - borrow \$100 from a bank and promise to pay back \$112 in 12 months.
   - deposit the \$100 dollars on a savings account at 1 percent a month and leave the money there for 12 months.
   - withdraw the money from the savings account and pay back \$112 to the bank.

   (a) Do you have any money left?

(b) Does it get better if you divide the year into days rather than months (i.e. you deposit the \$100 at 12/365 percent per day)? If so, how much better?

6. Prove by induction that a non-negative integer $x = b_n \cdots b_0$ written in binary notation is divisible by 3 if and only if $\sum_{i=0}^{n}(-1)^i b_i$ is divisible by 3. (Hint: using the notation of example 0.7 of the text, we have that x is divisible by three iff $x \equiv_3 0$. Therefore the claim is true if $x \equiv_3 \sum_{i=0}^{n}(-1)^i b_i$).