**Math 300.2** **Problem Set 4** **Fall, 2007**

## (Annotated as of 10/8/07)

## Due: Thursday, October 11 (start of class)

1. Do Exercise 1.1.26 (e). *Suggestion:* First fix the real number $x \geq 0$, so that the only variable will be $n$.

2. Do Exercise 1.1.26 (i). *Notes:* (1) You have to first determine for which values of $n$ the inequality holds. (2) You *may* wish to prove an equivalent inequality (for those values of $n$) that you get by somehow rephrasing the given inequality so that logarithms are no longer involved.

3. Do Exercise 1.1.27 (b). *Note:* First you have to discover the correct formula for the number of such handshakes for $n$ people. Explain how you arrived at your formula.

4. Do Exercise 1.1.27 (d). *Note:* First you have to discover the correct formula for the number of subsets of an $n$-element set. Explain how you arrived at your formula. (*Suggestion:* Tabulate the number of subsets for, say, $n = 0, 1, 2, 3$.)

   Once you have discovered the formula, you'll need to use induction to prove it. Note that what you will want to prove is that, for each $n = 0, 1, 2, \ldots$, and for *every* $n$-element set $X$, the number of subsets of $X$ is $\ldots$ (your formula).