Math 55 worksheet, February 25, 2009

1. Show that if A is a subset of B, then the power set of A is a subset of the power set of B.

2. Find all solutions to the system of congruences:

$$\begin{aligned} x &\equiv 2 \pmod 3 \\ x &\equiv 1 \pmod 4 \\ x &\equiv 3 \pmod 5 \end{aligned}$$

3. Find the prime factorization of 10!.

4. Let m be a positive integer. Show that $a \mathbin{\mathbf{mod}} m = b \mathbin{\mathbf{mod}} m$ if $a \equiv b \pmod m$.

5. Let a and b be real numbers with $a < b$. Use the floor and/or ceiling functions to find an expression for the number of integers n that satisfy the inequality $a \leq n \leq b$.

6. Devise an algorithm that, given the binary expansions of the integers a and b, determines whether $a > b$, $a = b$, or $a < b$.