HOMEWORK 16
DISCRETE MATHEMATICS I
DUE 04-04

(1) (a) Write down a formula for the 'exclusive or' set

$$A \,\Delta\, B = \{x \in U \mid (x \in A) \oplus (x \in B)\}$$

in terms of the existing set operations (union, intersection, complement, and relative difference). This new set is called the *symmetric difference* of A and B.

(b) Compute the symmetric difference of $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 4, 6, 8, 10\}$.

(2) (a) Find formulas for $|A \times B|$ and $|P(X)|$ in terms of $|A|$, $|B|$, and $|X|$. (HINT: Try some examples first! You don't have to *prove* the formula for $|A \times B|$.)

(b) Use induction on $n = |X|$ to prove that your formula for $|P(X)|$ is correct.

(c) Explain why $P(X)$ is sometimes also denoted by 2^X.

(3) Explain the following sentence from class:
"$\{3\} \in \{4, \{3\}\}$ but $\{3\} \not\subseteq \{4, \{3\}\}$, whereas $\{4\} \subseteq \{4, \{3\}\}$ but $\{4\} \notin \{4, \{3\}\}$."

- **Five** book problems: #2.1.17, 18, 19; #2.2.31, 32.