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CS U390, Spring 2007 (Instructor: Clinger)
Homework 0
Assigned:  Thursday, 11 January 2007
Due:       Wednesday, 17 January 2007
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1. [5 pts] For each of the following set operations, specify the result by listing its elements inside curly braces.

   (a) $\{1,2\} \cup \{2,3,4\} =$
   (b) $\{1,2\} \cap \{2,3,4\} =$
   (c) $\{1,2\} - \{2,3,4\} =$
   (d) $\{2,3,4\} - \{1,2\} =$
   (e) $\{1,2\} \times \{2,3,4\} =$

2. [6 pts] Write out each of the following power sets by listing their elements inside curly braces.

   (a) $\mathcal{P}(\{1,2,3\}) =$
   (b) $\mathcal{P}(\{1\}) =$
   (c) $\mathcal{P}(\emptyset) =$

3. [5 pts] If S is any set, then we use the notation $|S|$ to indicate the number of elements in S. Suppose A, B, and C are sets with $|A| = 4$, $|B| = 7$, and $|C| = 11$. Compute the number of elements in each of the following sets.

   (a) $|A \times A| =$
   (b) $|B \times C| =$
   (c) $|\mathcal{P}(A)| =$
   (d) $|\mathcal{P}(B)| =$
   (e) $|\mathcal{P}(A \times B)| =$

4. [10 pts] For any $n \in \mathcal{N}$, we say that n is odd if and only if there exists $m \in \mathcal{N}$ such that $n = 2m + 1$. From this definition, give a rigorous proof that the product of two odd numbers is odd.

5. [10 pts] Prove that there is no largest natural number. (In other words, prove that there is no $l \in \mathcal{N}$ such that $l \geq n$ for all $n \in \mathcal{N}$. Hint: for all $n \in \mathcal{N}$, $n + 1 > n$.)