Name: _____

Math 166 - Theory of Computability - Winter 1999

"Pop" Quiz #2

1. Write out these sets explicitly (by listing all their elements).
   $\mathcal{P}(X)$ denotes the powerset of X. Use (x, y) notation for ordered pairs.

   (a) $\mathcal{P}(\emptyset) = \{\emptyset\}$.

   (b) $\mathcal{P}(\{\emptyset\}) = \{\emptyset, \{\emptyset\}\}$

   (c) $\mathcal{P}(\{a, b\}) \setminus \{a, b, \{a\}\} = \{\emptyset, \{b\}, \{a, b\}\}$.

   (d) $\{a, b\} \times \{c\} = \{(a, c), (b, c)\}$.

   (e) $\{a, b\} \times \{\{c\}\} = \{(a, \{c\}), (b, \{c\})\}$.

   (f) $\{a, b\} \cup (\{b, c\} \cap \{a, c\}) = \{a, b, c\}$.

   (g) $(\{a, b\} \cup \{b, c\}) \cap \{a, c\} = \{a, c\}$.

2. Indicate whether the statements are true or false:

T (c) Caterpillars have wings if dogs have wings.

F (c) Butterflies have wings only if caterpillars have wings.

F (c) For all sets A, if $\emptyset \in \mathcal{P}(A)$, then A is empty. [CONSIDER: $A = \{\emptyset\}$.]

3. Describe the following sets in English: ($\mathbb{N}$ is the set of non-negative integers.)

   (a) $\{n \in \mathbb{N} : n$ is greater than each prime in $\mathbb{N}\}$
   ANS: $\emptyset$

   (b) $\{n \in \mathbb{N} : n$ is greater than some prime in $\mathbb{N}\}$
   ANS:{3,4,5,6,...} The set of integers greater than 2.