Math 166 - Theory of Computability - Winter 1999

“Pop” Quiz #2

1. Write out these sets explicitly (by listing all their elements). $2^X$ denotes the powerset of $X$. Use $(x, y)$ notation for ordered pairs.

   (a) $2^\emptyset = \,$
   
   (b) $2^\{\emptyset\} = \,$
   
   (c) $2^{\{a, b\}} \setminus \{a, b, \{a\}\} = \,$
   
   (d) $\{a, b\} \times \{c\} = \,$
   
   (e) $\{a, b\} \times \{\{c\}\} = \,$
   
   (f) $\{a, b\} \cup (\{b, c\} \cap \{a, c\}) = \,$
   
   (g) $(\{a, b\} \cup \{b, c\}) \cap \{a, c\} = \,$

2. Indicate whether the statements are true or false:

   ___ (c) Caterpillars have wings if dogs have wings.
   
   ___ (c) Butterflies have wings only if caterpillars have wings.
   
   ___ (c) For all sets $A$, if $\emptyset \in 2^A$, then $A$ is empty.

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

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

   (b) $\{ n \in \mathbb{N} : n \text{ is greater than some prime in } \mathbb{N} \}$