Math 166A - Theory of Computability - Winter 1998

Pop Quiz #1

1. Indicate whether the following are true or false:
   (2^X denotes the powerset of X)

____(a) $\emptyset \subseteq \emptyset$

____(b) $\emptyset \in \emptyset$

____(c) $\emptyset \in \{\emptyset\}$

____(d) $\emptyset \subseteq \{\emptyset\}$

____(e) $\{a,b\} \in \{a,b,\{a,b\}\}$

____(f) $\{a,b\} \subseteq \{a,b,\{a,b\}\}$

____(g) $\{a,b,\{a,b\}\} \setminus \{a,b\} = \{a,b\}$

____(h) $\{a,b\} \subseteq 2^{\{a,b,\{a,b\}\}}$

____(i) $\{\{a,b\}\} \in 2^{\{a,b,\{a,b\}\}}$

2. Which of the following are true statements?

____(a) Dogs have wings only if cats have wings.

____(b) Birds have wings only if cats have wings.

____(c) If cats have wings then birds have wings.

3. Let $\mathbb{Z}$ denote the set of integers. Describe, as simply as possible, the following sets in English:

   (a) $\{2k : k \in \mathbb{Z}\}$

   (b) $\{4n : n \in \mathbb{Z}\} \cup \{4n + 2 : n \in \mathbb{Z}\}$

   (c) $\{n : n = 2k \text{ for some } k \in \mathbb{Z}\}$

   (d) $\{n : n = 2k \text{ for all } k \in \mathbb{Z}\}$

   (e) $\{4k : k \in \mathbb{Z}\} \setminus \{2k : k \in \mathbb{Z}\}$