Name: _____ Student ID:

Math 166 - Theory of Computability - Fall 1999

Quiz #1 — October 7

1. Write out these sets explicitly (by listing all their elements **with no duplication**). $\mathcal{P}(X)$ denotes the powerset of X. Use (x, y) notation for ordered pairs. "$-$" is "set minus". "$\emptyset$" denotes the empty set.

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

   (b) $\mathcal{P}(\{1,1,2\}) \quad =$

   (c) $\{1,3\} \times \{1,2\} \quad =$

   (d) $(\{1,2\} \cap \{2,3\}) - \{1,3\} \quad =$

   (e) $(\{1,2\} - \{2,3\}) \cup \{1,2\} \quad =$

   (f) $\mathcal{P}(\{1,2\}) - \{1,\{2\}\} \quad =$

2. Indicate whether the statements are true or false:

____(a) $\emptyset \subseteq \mathcal{P}(\{1,2\})$.

____(b) $\emptyset \in \mathcal{P}(\{1,2\})$.

____(c) $1 \in \mathcal{P}(\{1,2\})$.

____(d) For all sets A, $A \in \mathcal{P}(A)$ only if A is empty.

____(e) If cats can fly, then birds can fly.

____(f) Birds can fly only if cats can fly.

____(g) Horses can fly only if cats can fly.

3. Describe the following sets as simply as you can: ($\mathbb{N}$ is the set of non-negative integers.)

   (a) $\{n \in \mathbb{N} : n \geq k \text{ for some } k \text{ in } \mathbb{N}\}$

   (b) $\{n \in \mathbb{N} : n \geq k \text{ for all } k \text{ in } \mathbb{N}\}$