1. For each of these pairs of sets, determine whether the first is a subset of the second, the second is a subset of the first, or neither is a subset of the other.

(a) The set of airline flights from New York to New Delhi, the set of non stop airline flights from New York to New Delhi.

(b) The set of people who speak English, the set of people who speak Chinese.

(c) The set of flying squirrels, the set of living creatures that can fly.   (3 Marks)

2. Determine whether each of the following statements is true or false.

(a) $0 \in \varnothing$.

(b) $\varnothing \in \{0\}$

(c) $\varnothing \subset \{0\}$

(d) $\{0\} \in \{0\}$

(e) $\{0\} \subset \{0\}$

(f) $\{\varnothing\} \subseteq \{\varnothing\}$ (3 Marks)

3. Use a Venn diagram to illustrate the set of all months of the year whose names do not contain the letter R in the set of all months of the year.   (3 Marks)

4. Use a Venn diagram to illustrate the relationships $A \subset B \text{ and } B \subset C$.   (3 Marks)

5. What is the cardinality of each of these sets?

(a) $\{a\}$

(b) $\{\{a\}\}$

(c) $\{a, \{a\}\}$

(d) $\{a, \{a\}, \{a, \{a\}\}\}$ (4 Marks)

6. Let A be a set. Show that $\varnothing \times A = A \times \varnothing = \varnothing$.   (3 Marks)

7. Find the sets A and B if $A - B = \{1, 5, 7, 8\}$, $B - A = \{2, 10\}$, and $A \cap B = \{3, 6, 9\}$.   (3 Marks)

8. Explain why $A \times B \times C$ and $(A \times B) \times C$ are not the same.   (3 Marks)

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