

Activity 21 – Introduction to Proof
containment

- (1) Name three elements of \mathbb{N} .

- (2) Name three subsets of \mathbb{N} .

- (3) The empty set, \emptyset is contained in every set A (regardless of A 's contents). Why?

- (4) Let A be the set $\{\emptyset, 1, 2, \{3, 4, 5\}\}$. Mark the following statements True or False.
 - a) $\emptyset \subseteq A$
 - b) $\emptyset \in A$
 - c) $\{1\} \subseteq A$
 - d) $\{3, 4, 5\} \subseteq A$
 - e) $\{\emptyset\} \subseteq A$
 - f) $\{1, 2\} \in A$

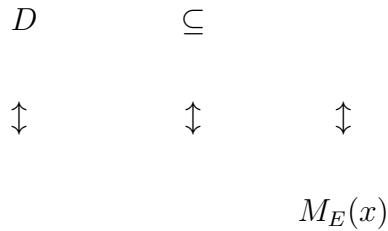
- (5) Insert either \in or \subseteq in the blanks in the following sentences (in order to produce true sentences).

- i) 1 _____ $\{3, 2, 1, \{a, b\}\}$ iii) $\{a, b\}$ _____ $\{3, 2, 1, \{a, b\}\}$
 ii) $\{a\}$ _____ $\{a, \{a, b\}\}$ iv) $\{\{a, b\}\}$ _____ $\{a, \{a, b\}\}$

- (6) A number is called *doubly even* if it is divisible by 4. Let D denote the set of doubly-even natural numbers, and let E denote the set of even natural numbers. Which set is a subset of the other?

- (7) The membership criteria for the sets D and E in the previous question are $M_D = 4|x$ and $M_E = 2|x$ respectively. Which logical statement implies the other?

- (8) The following incomplete diagram illustrates the correspondence between Set Theory (in the top row) and Logic (in the bottom row). Fill in the missing symbols.



(9) Name a superset of \mathbb{N} .

(10) Name a superset of \mathbb{R} .

(11) In the next lecture we'll talk about set equality. How would you describe a reasonable way to determine if two sets are "the same"?