Section 2.1 HW

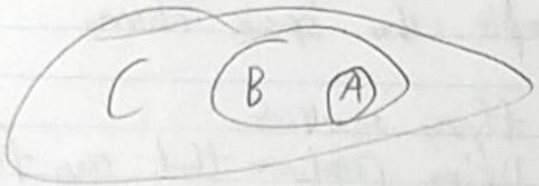
3. For each of these pairs of sets, determine whether the 1st is a subset of the second
   a. The set of airline flights from New York to New Delhi.
      The set of nonstop flights from NY to ND
      - Yes
   b. The set of people who speak english
      The set of people who speak chinese
      - No
   c. The set of flying squirrels
      The set of living creatures that can fly
      - No

6. Suppose that $A = \{2, 4, 6\}$, $B = \{2, 6\}$, $C = \{4, 8\}$ $D = \{4, 6, 8\}$
   - Which of these sets are subsets of which other sets
   - $B \subset A$, $C \subset A$, $C \subset D$

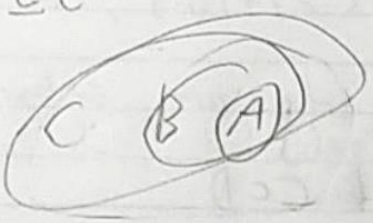
8. For each determine if $\{2\}$ is an element of that set
   a. $\{x \in \mathbb{R} \mid x \text{ is an integer} > 1\}$
      true
   b. $\{x \in \mathbb{R} \mid x \text{ is the square of an integer}\}$
      false
   c. $\{2, \{2\}\}$
      true
   d. $\{\{2\}, \{\{2\}\}\}$
      false
   e. $\{\{2\}, \{2, \{2\}\}\}$
      false
   f. $\{\{\{2\}\}\}$
      false

10. Determine whether these are true or false
a. $\emptyset \in \{\emptyset\}$: true b. $\emptyset \in \{\emptyset, \{\emptyset\}\}$: true
c. $\{\emptyset\} \in \{\emptyset\}$: true d. $\{\emptyset\} \in \{\{\emptyset\}\}$: true
e. $\{\emptyset\} \subset \{\emptyset, \{\emptyset\}\}$: true f. $\{\{\emptyset\}\} \subset \{\emptyset, \{\emptyset\}\}$: true

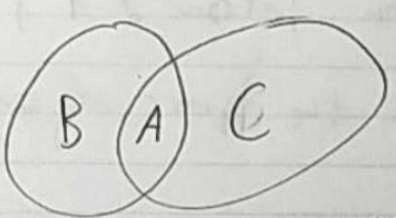
14. Use a Venn Diagram to illustrate $A \subseteq B$ and $B \subseteq C$



15. Use a Venn diagram to illustrate $A \subset B$ and $B \subseteq C$



16. Use a venn diagram to illustrate $A \subset B$ and $A \subset C$



20. What is the cardinality
a) $\emptyset$: 0 b) $\{\emptyset\}$: 1
c) $\{\emptyset, \{\emptyset\}\}$: 2 d) $\{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}$: 3

21. Can you conclude $A = B$ if A and B have the same power set

23. How many elements does each power set have
a. $P(\{a, b, \{a, b\}\})$: 8
b. $P(\{\emptyset, a, \{a\}, \{\{a\}\}\}) = 16$
c. $P(P(\emptyset)) = 2$

29. What is the cartesian product $A \times B \times C$ where A is the set of all airlines and B and C is the set of all cities
the set of all airlines and their source and destination

30. Suppose $A \times B = \emptyset$. What can you conclude
A and B are $\emptyset$

35. How many different elements does $A \times B \times C$ has if A has m elements, B has n elements, C has p elements
$m \cdot n \cdot c$

41. Translate each quantifications to english
a. $\forall x \in \mathbb{R}\ (x^2 \neq -1)$
- All x in the set of all real numbers squared is not -1
- true
b. $\exists \mathbb{Z}\ (x^2 = 2)$
- There exists an integer such that when squared it is 2
- false
c. $\forall x \in \mathbb{Z}\ (x^2 > 0)$
- All integers squared are greater than 0
- false
d. $\exists x \in \mathbb{R}\ (x^2 = x)$
- There exists an x such that $x^2 = x$
- true

43. Find the truth set of each predicate

a. $P(x)$: $x^2 < 3$

$\{x \in \mathbb{Z} \mid x^2 < 3\}$ $\{0, 1\}$

b. $Q(x)$: $x^2 > x$

$\{x \in \mathbb{Z} \mid x > 1\}$