Problem Set 2

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Problem 1

a. Item 1a solution here.

$$Members(p, a, b) ::= \forall z.(z \in p \iff z = a \vee z = b)$$

b. Item 1b solution here.

$$p = Pair(a, b) ::= Members(p, a, \{a, b\})$$

c. Item 1c solution here.

$$Second(p, b) ::= \exists z.\exists y.(Members(p, z, y) \wedge Members(y, z, b))$$

Problem 2

$$\overline{A \cap B} = \overline{A} \cup \overline{B}$$

$$z \in \overline{A \cap B} \iff z \in \overline{A} \cup \overline{B}$$

$$\iff z \in \overline{A} \vee z \in \overline{B}$$

$$\iff NOT(z \in A) \vee NOT(z \in B)$$

Considering the propositional version of De Morgan's Law:

$$NOT(z \in A) \vee NOT(z \in B) \equiv NOT(z \in A \wedge z \in B)$$

$$NOT(z \in A \wedge z \in B) \iff NOT(z \in A \cap B)$$

$$\iff z \notin A \cap B$$

$$\iff z \in \overline{A \cap B}$$