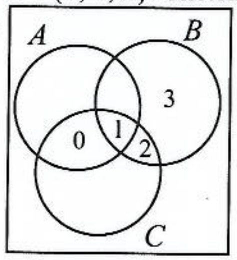
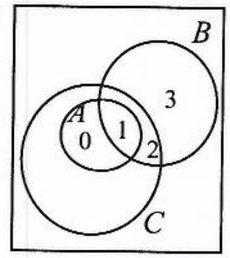
Exercises:

Suppose $A = \{0, 1\}$ $B = \{1, 2, 3\}$, $C = \{0, 1, 2\}$. Sketch a Venn Diagram to illustrate their relationship.

Here is one possible Venn diagram:



We can resize the circles to show that A is entirely contained in C and that 2 is a member of both B and C but not in A, and 3 is a member only to B. So this Venn Diagram is also correct:



Insert the appropriate symbol $\in$, $\notin$, $\subseteq$, $\subset$, or $\not\subseteq$ in the blank to make a true statement.

2 ____ B   A ____ B   C ____ $A \cup C$

2 ____ C   A ____ C   A ____ $A \cap C$

$2 \in B$

$2 \notin C$

$A \not\subseteq B$. A is not a subset of B since 0 is in A but 0 is not a member of B.

$A \subset C$. A is a proper subset of C since all of A is contained in C, and 2 is a member of C that is not in A.

$C \subseteq A \cup C$ since $A \cup C = \{0, 1, 2\}$ and $C = \{0, 1, 2\}$

$A \subseteq A \cap C$ since $A \cap C = \{0, 1\}$ and $A = \{0, 1\}$

Closure Property for Addition:

A set of numbers is "closed under addition" if the sum of any two members (*including themselves*) is also in that set.

$A = \{0, 1\}$ $B = \{1, 2, 3\}$, $C = \{0, 1, 2\}$.

Which of the sets A, B, and C, are closed under addition?

Not A: 1+1=2 and $2 \notin A$.

Not B: 2+3=5 and $5 \notin B$.

Not C: 1+2=3 and $3 \notin C$.

Similarly, which are closed under subtraction?

Not A: 0−1=−1 and $-1 \notin A$.

Not B: 2−2=0 and $0 \notin$ B.

Not C: 0−2=−2 and $-2 \notin C$.

Which of the sets are closed under multiplication?

Just set A.

Not B or C (2×2=4 and $4 \notin B$ and $4 \notin$ C.

Which of the sets are closed under division?

Not A or C. $1 \div 0$ is undefined and in neither set.

Not B: $1 \div 2$= ½ and ½ $\notin B$.