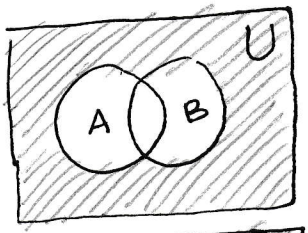
1. (3 points) Suppose $A_1 = \{a, b, d, e, g, f\}$, $A_2 = \{a, b, c, d\}$, $A_3 = \{b, d, a\}$, $A_4 = \{a, b, h\}$. What is $\bigcup_{i=1}^{4} A_i$? What is $\bigcap_{i=1}^{4} A_i$?

$\bigcup_{i=1}^{4} A_i = \{a, b, c, d, e, f, g, h\}$

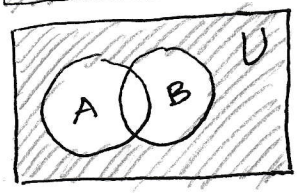
$\bigcap_{i=1}^{4} A_i = \{a, b\}$

2. (3 points) Suppose sets A and B are in a universal set U. Draw Venn diagrams for $\overline{A \cup B}$ and for $\overline{A} \cap \overline{B}$. Based on your drawings, do you think it's true that $\overline{A \cup B} = \overline{A} \cap \overline{B}$?

$\overline{A \cup B}$ ⇨



$\overline{A} \cap \overline{B}$ ⇨



$\therefore \quad \overline{A \cup B} = \overline{A} \cap \overline{B}$ true ✓

3. (4 points) What is $\mathscr{P}(\mathscr{P}(\{2\}))$

$\mathscr{P}(\{2\}) = \{\varnothing, \{2\}\}$

$\mathscr{P}(\mathscr{P}(\{2\})) = \{\varnothing, \{\varnothing\}, \{\{2\}\}, \{\varnothing, \{2\}\}\}$