Sample Solution

Solution 1. i) let $A_1, \dots, A_n \in \mathscr{A}$, and then by definition $\bigcup_{1 \le i \le n} A_n \in \mathscr{A}$, since $A_i^c \in \mathscr{A}$ for all i. Hence,

$$\bigcup A_i^c = (\bigcap A_i)^c \in \mathscr{A}$$

implies

$$\bigcap A_i \in \mathscr{A}$$

where $i \in \{1, \dots, n\}$

ii) Just use the complement axiom twice

iii) Notice that $A \backslash B = A \cap B^c$ and $A \triangle B = (A \backslash B) \cup (B \backslash A)$