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$$x \in (A^\circ \cap B^\circ) \Rightarrow (x \in A^\circ) \wedge (x \in B^\circ) \Rightarrow (\exists B_r(x) \subset A) \wedge (\exists B_r(x) \subset B) \Rightarrow \exists B_r(x) \subset (A \cap B)$$

$$\Rightarrow x \in (A \cap B)^\circ$$

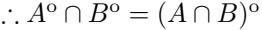
$$\therefore A^\circ \cap B^\circ \subseteq (A \cap B)^\circ$$

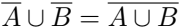
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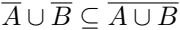
$$x \in (A \cap B)^{\circ} \Rightarrow \exists B_r(x) \subset (A \cap B) \Rightarrow (\exists B_r(x) \subset A) \wedge (\exists B_r(x) \subset B) \Rightarrow (x \in A^{\circ}) \wedge (x \in B^{\circ})$$

$$\Rightarrow x \in (A \cap B)^{\circ}$$

$$\therefore (A \cap B)^{\circ} \subseteq A^{\circ} \cap B^{\circ}$$



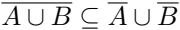




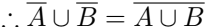
$$x \in (\overline{A} \cup \overline{B}) \Rightarrow (x \in \overline{A}) \vee (x \in \overline{B}) \Rightarrow (\forall B_r(x), B_r(x) \cap A \neq \emptyset) \vee (\forall B_r(x), B_r(x) \cap B \neq \emptyset)$$

$$\Rightarrow (\forall B_r(x), B_r(x) \cap (A \cup B) \neq \emptyset) \Rightarrow x \in \overline{(A \cup B)}$$

$$\therefore \overline{A} \cup \overline{B} \subseteq \overline{A \cup B}$$



$$\begin{aligned}
x \in \overline{(A \cup B)} &\Rightarrow \forall B_r(x), B_r(x) \cap (A \cup B) \neq \emptyset \Rightarrow (\forall B_r(x), B_r(x) \cap A \neq \emptyset) \cup (\forall B_r(x), B_r(x) \cap B \neq \emptyset) \\
&\Rightarrow (\forall B_r(x), B_r(x) \cap A \neq \emptyset) \vee (\forall B_r(x), B_r(x) \cap B \neq \emptyset) \\
&\Rightarrow (x \in \overline{A}) \vee (x \in \overline{B}) \Rightarrow x \in \overline{(A \cup B)} \\
&\therefore \overline{A \cup B} \subseteq \overline{A} \cup \overline{B}
\end{aligned}$$















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