Theorem (2.2.18d)**.** *Let A, B, and C be sets.* $(A - C) \cap (C - B) = \emptyset$.

Proof. Let x be an element in $(A - C) \cap (C - B)$. This is equivalently stated as $x \in [(A \cap \overline{C}) \cap (C \cap \overline{B})]$. Since set intersection is associative the inner parentheses can be eliminated, $x \in (A \cap \overline{C} \cap C \cap \overline{B})$. An expression the definition for which is $(x \in A) \wedge (x \in \overline{C}) \wedge (x \in C) \wedge (x \in \overline{B})$. But by the logical law of negation this definition states $(x \in A) \wedge \perp \wedge (x \in \overline{B}) \equiv \perp$. Meaning $\neg \exists x (x \in (A - C) \cap (C - B))$. In other words, the intersection is indeed empty. ∎