$cl(A \cap B) = cl(A) \cap cl(B)$
is false.

Let $A = (0,1)$
$\quad B = (1,2)$

then $A \cap B = \phi$

and $cl(A \cap B) = \phi$

But $cl\,A = [0,1]$
$\quad cl\,B = [1,2]$

and $cl\,A \cap cl\,B = \{1\}$.