Let A, B, and C be sets. Use the definition of set equality to prove that

(A-C) ∩(C-B)=0

PROOF

1. Let x ∈ (A-C) ∩(C-B)
   1. Using the definition of intersection, x is in the intersection when it is in both sets (duh)
      1. x ∈ (A-C) ^ x ∈ (C-B)
   2. Using the definition of the difference A-C we know that x is in A and x is not in C
      1. x ∈ A ^ ¬(x ∈ C) ^ x ∈ C ^ ¬( x ∈ B)
   3. Negation law for propositions
      1. x ∈ A ^ G ^ ¬( x ∈ B)
   4. Domination law
      1. G
   5. Emptyset doesn’t contain elements, so statement x ∈ 0 is false always.
   6. By definition of subset, we show that (A-C) ∩(C-B) ⊆0
2. Empty set is a subset of every set
   1. 0⊆(A-C)
3. Conclusion:
   1. Since (A-C) ∩(C-B) ⊆0 and 0⊆(A-C), the two sets have to be the same

(A-C) ∩(C-B)=0