§Why

How does taking complements relate to forming unions and intersections.

§Complements of unions or intersections

Let E denote a set. Let A and B denote sets and $A, B \subset E$. All complements are taken with respect to E. The following are known as *DeMorgan's Laws*.[1]

Proposition 1. $C(A \cup B) = C(A) \cap C(B)$

Proposition 2. $C(A \cap B) = C(A) \cup C(B)$

§Principle of duality

As a result of DeMorgan's Laws[2] and basic facts about complements (see Set Complements) theorems having to do with sets come in pairs. In other words, given an inclusion or identity relation involving complements, unions and intersections of some set (above E) if we replace all sets by their complemnets, swap unions and intersections, and flip all inclusions we obtain another result. This is called the *principle of duality for sets*.

---

[1]Proofs will appear in a future edition.

[2]A future edition will change the name to remove the reference to DeMorgan in accordance with the project's policy.

Set Dualities

Pair Intersections → Pair Unions

Pair Unions → Set Unions

Set Dualities → Set Complements

Set Unions → Unordered Pairs, Empty Set

Set Complements → Empty Set, Set Differences

Unordered Pairs → Set Specification

Empty Set → Set Specification

Set Differences → Set Specification

Pair Intersections → Set Specification

Set Specification → Set Inclusion

Set Inclusion → Standardized Accounts

Standardized Accounts → Accounts

Accounts → Deductions

Deductions → Quantified Statements

Quantified Statements → Logical Statements

Logical Statements → Statements

Statements → Identities, Sets

Identities → Names

Sets → Names

Names → Letters, Objects

4