

Venn Diagrams I

$P \cap Q$ say P **intersection** Q

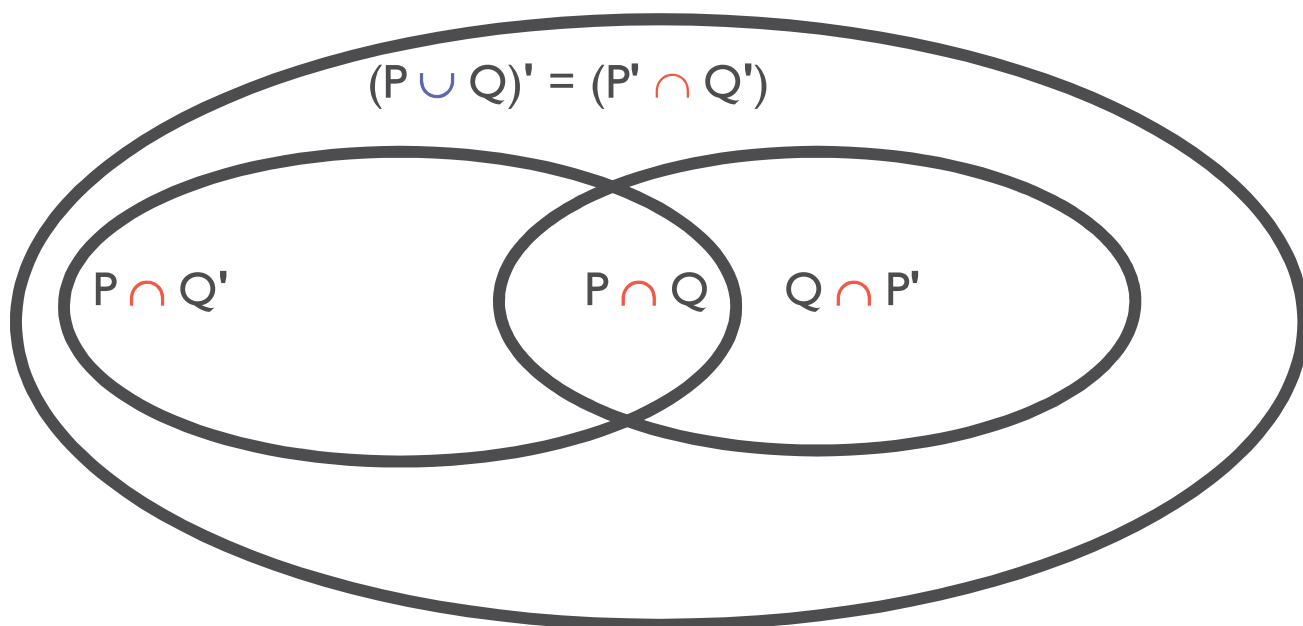
means P **AND** Q

$P \cup Q$ say P **union** Q

means P **OR** Q or both

$$n(P \cup Q)$$

$$= n(P) + n(Q) - n(P \cap Q)$$



where the left ellipse is (P) and the right ellipse is (Q)

Thus $n(P) = n(P \cap Q') + n(P \cap Q)$

and $n(Q) = n(Q \cap P') + n(Q \cap P)$

hence $n(P \cap Q) = n(P) - n(P \cap Q')$

$$n(P \cap Q) = n(Q) - n(P' \cap Q)$$

From diagram

$$(P \cup Q)' = (P' \cap Q')$$

†

$$(P \cap Q)' = (P' \cup Q')$$

†

Notes

There is also the term $P \setminus Q$ (say "P diff Q") $\equiv P \cap Q'$

It immediately follows that $P \setminus Q \equiv Q' \setminus P'$ which is similar to the contrapositive rule.

† these are de Morgan's Rules