Boolean laws

$P\cap Q = Q\cap P$
-- commutativity
$P\cap(Q\triangle R)\triangle P\cap Q = P\cap R$
$P\cap Q\cap R = P\cap(Q\cap R)$
-- associativity
$P\triangle Q\triangle R = P\triangle(Q\triangle R)$
-- associativity
$\_\cap\emptyset = \emptyset$
-- multiplicative annichilator
$P\cap P = P$
-- idempotency
$P\cap(P\cap Q) = P\cap Q$
$P\cap Q = P \& Q\cap P = Q \rightarrow Q = P$
$P\cap Q = Q \& Q\cap R = Q \rightarrow P\cap R = P$
$P\triangle Q = Q\triangle P$
-- commutativity
$P\triangle(Q\triangle R) = Q\triangle(P\triangle R)$
-- permuted associativity
$\emptyset\triangle P = P$
-- additive unit
$P\triangle P = \emptyset$
$P\triangle(P\triangle Q) = Q$
$P\cap(Q\triangle R) = P\cap Q\triangle P\cap R$
-- distributivity

$P \setminus Q = P\triangle P\cap Q$
-- : this could be taken as a definition
$P\subseteq Q \leftrightarrow P\cap Q = P$
-- : this could be taken as a definition
$P\subseteq Q \rightarrow Q \setminus (Q \setminus P) = P$
$P\subseteq Q \& R\subseteq Q \rightarrow (Q \setminus P)\cap R = R\triangle P\cap R$
$P\subseteq Q \& R\subseteq Q \rightarrow (Q \setminus P)\triangle R = Q \setminus P\triangle R$
$(\_ \setminus P)\cap P = \emptyset$
$P\subseteq Q \rightarrow P\triangle(Q \setminus P) = Q$
$P\subseteq Q \& R\subseteq Q \rightarrow (P\cap R = P \leftrightarrow P\cap(Q \setminus R) = \emptyset)$
$P\subseteq Q \& R\subseteq Q \rightarrow P\triangle R = Q \setminus (Q \setminus (Q \setminus P)\cap R)\cap(Q \setminus P\cap(Q \setminus R))$
$P\subseteq Q \& R\subseteq Q \rightarrow Q \setminus P\triangle R = (Q \setminus (Q \setminus P)\cap R)\cap(Q \setminus P\cap(Q \setminus R))$
$P\cup Q = P\triangle Q\triangle P\cap Q$
-- : this could be taken as a definition
$P\cup Q\cup R = P\cup(Q\cup R)$
-- associativity
$P\cup Q = Q\cup P$
-- commutativity
$\emptyset\cup P = P$
-- unit element
$P\cup P = P$
-- idempotency
$P\cap(Q\cap(P\cup\_)) = P\cap Q$
$P\cup P\cap\_ = P$
$P\subseteq Q \& R\subseteq Q \rightarrow (Q \setminus P)\cap R\cup P\cap R = R$
$P\subseteq Q \& R\subseteq Q \rightarrow Q \setminus (P\cup R) = (Q \setminus P)\cap(Q \setminus R)$
$P\cup(P\cup Q) = P\cup Q$
$P\cup(Q\cup R) = Q\cup(P\cup R)$
$(P\cup Q)\cap(P\cup R) = P\cup Q\cap R$
$P\subseteq Q \& R\subseteq Q \& S\subseteq Q \rightarrow Q \setminus P\cup(R\cup P\cap S) = Q \setminus P\cup(R\cup S)$
$P\subseteq Q \& R\subseteq Q \& S\subseteq Q \rightarrow P\cup R\cup(Q \setminus P)\cap S = P\cup(R\cup S)$
$P\cup\_ = \emptyset \rightarrow P = \emptyset$
$P\subseteq Q \& R\subseteq Q \rightarrow P\triangle R = P\cap(Q \setminus R)\cup(Q \setminus P)\cap R$
$P\subseteq Q \& R\subseteq Q \rightarrow (P\cup R)\cap(Q \setminus P\cap R) = P\cap(Q \setminus R)\cup(Q \setminus P)\cap R$
$P\subseteq Q \& R\subseteq Q \rightarrow P\triangle R = P\cap(Q \setminus R)\cup(Q \setminus P)\cap R$