Logical Equivalence Laws

Given any statement variables p, q, and r, a tautology **t** and a contradiction **c**, the following logical equivalences hold:

Commutative laws:	p∧q ≡ q∧p	$p \lor q \equiv q \lor p$
Associative laws:	(p∧q)∧r ≡ p∧(q∧r)	$(p \lor q) \lor r \equiv p \lor (q \lor r)$
Distributive laws:	p∧(q∨r) ≡ (p∧q)∨(p∧r)	$p \lor (q \land r) \equiv (p \lor q) \land (p \lor r)$
Identity laws:	p∧**t** ≡ p	$p \lor \mathbf{c} \equiv p$
Negation laws:	p ∨ ~p ≡ **t**	$p \land {\sim}p \equiv \mathbf{c}$
Double negative law:	~(~p) ≡ p	
Idempotent laws:	p∧p ≡ p	$p \lor p \equiv p$
Universal bound laws:	p ∨ **t** ≡ **t**	$p \land \mathbf{c} \equiv \mathbf{c}$
DeMorgan's laws:	~(p∧q) ≡ ~p∨~q	$\sim(p \lor q) \equiv {\sim}p \land {\sim}q$
Absorption laws:	p∨(p∧q) ≡ p	$p \land (p \lor q) \equiv p$
Negations of **t** and **c**	~**t** ≡ **c**	~**c** ≡ **t**