Logical Tautologies

1.	P v ~P	excluded middle
2.	~(P & ~P)	noncontradiction
3.	~~P = P	double negation
4.	(P & Q) -> P	simplification
5.	P -> (P v Q)	simplification
6.	(P & P) = P	idempotence
7.	(P v P) = P	idempotence
8.	(P & (P -> Q)) -> Q	modus ponens
9.	((P -> Q) & (Q -> R)) -> (P -> R)	syllogism
10.	(P -> Q) = (~Q -> ~P)	contraposition
11.	((P -> Q) & ~Q) -> ~P	modus tollens
12.	((P v Q) & ~P) -> Q	disjunctive syllogism
13.	(P -> Q) = (~P v Q)	conditional disjunction
14.	(~P -> (Q & ~Q)) -> P	reductio ad absurdum
15.	(((P -> R) & (Q -> S)) & (P v Q)) -> (R v S)	dilemma
16.	(P -> (Q -> R)) = ((P & Q) -> R)	exportation
17.	(P = Q) = ((P -> Q) & (Q -> P))	biconditional
18.	~(P v Q) = (~P & ~Q)	DeMorgan
19.	~(P & Q) = (~P V ~Q)	DeMorgan
20.	~(P -> Q) = (P & ~Q)	negation of conditional
21.	~(P = Q) = (~P = Q)	negation of biconditional

22.	(P v Q) = (Q v P)	commutativity
23.	(P & Q) = (Q & P)	commutativity
24.	(P = Q) = (Q = P)	commutativity
25.	((P v Q) v R) = (P v (Q v R))	associativity
26.	((P & Q) & R) = (P & (Q & R))	associativity
27.	((P = Q) = R) = (P = (Q = R))	associativity
28.	(P & (Q v R)) = ((P & Q) v (P & R))	distribution
29.	(P v (Q & R)) = ((P v Q) & (P v R))	distribution
30.	(P -> (Q v R)) = ((P -> Q) v (P -> R))	distribution
31.	(P -> (Q & R)) = ((P -> Q) & (P -> R))	distribution
32.	((P v Q) -> R) = ((P -> R) & (Q -> R))	disjunction/conditional
33.	((P & Q) -> R) = ((P -> R) v (Q -> R))	conjunction/conditional
34.	(P -> Q) -> ((R & P) -> (R & Q))	factorization
35.	(P -> Q) -> ((R v P) -> (R v Q))	summation