Some Useful Equivalences - A Cheat Sheet

Fairly intuitive:

Commutative:

$$P \wedge Q \equiv Q \wedge P$$
$$P \vee Q \equiv Q \vee P$$

Distributive:

$$P \wedge (Q \vee R) \equiv (P \wedge Q) \vee (P \wedge R)$$
$$P \vee (Q \wedge R) \equiv (P \vee Q) \wedge (P \vee R)$$

Associative:

$$P \wedge (Q \wedge R) \equiv (P \wedge Q) \wedge R$$
$$P \vee (Q \vee R) \equiv (P \vee Q) \vee R$$

Less intuitive:

Contrapositive:

$$P \Rightarrow Q \equiv (\neg Q) \Rightarrow (\neg P) \tag{1}$$

DeMorgan's Laws:

$$\neg(P \wedge Q) \equiv (\neg P) \vee (\neg Q)$$
$$\neg(P \vee Q) \equiv (\neg P) \wedge (\neg Q)$$

Negating Quantifiers:

$$\neg(\forall x \in X, P(x)) \equiv \exists x \in X, \neg P(x)$$
$$\neg(\exists x \in X, P(x)) \equiv \forall x \in X, \neg P(x)$$

Negating conditionals:

$$\neg(P \Rightarrow Q) \equiv P \wedge \neg Q \tag{2}$$