Laws of the Algebra of Sets

Idempotent Laws	1a. $A \cup A = A$	1b. $A \cap A = A$
Associative Laws	2a. $(A \cup B) \cup C = A \cup (B \cup C)$	2b. $(A \cap B) \cap C = A \cap (B \cap C)$
Commutative Laws	3a. $A \cup B = B \cup A$	3b. $A \cap B = B \cap A$
Distributive Laws	4a. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$	4b. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
Identity Laws	5a. $A \cup \varnothing = A$ 6a. $A \cup S = S$	5b. $A \cap S = A$ 6b. $A \cap \varnothing = \varnothing$
Involution Law	7. $(A^C)^C = A$	
Complement Laws	8a. $A \cup A^C = S$ 9a. $S^C = \varnothing$	8b. $A \cap A^C = \varnothing$ 9b. $\varnothing^C = S$
De Morgan's Laws	10a. $(A \cup B)^C = A^C \cap B^C$	10b. $(A \cap B)^C = A^C \cup B^C$

Laws of the Algebra of Propositions

Idempotent Laws	1a. $p \vee p \equiv p$	1b. $p \wedge p \equiv p$
Associative Laws	2a. $(p \vee q) \vee r \equiv p \vee (q \vee r)$	2b. $(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$
Commutative Laws	3a. $p \vee q \equiv q \vee p$	3b. $p \wedge q \equiv q \wedge p$
Distributive Laws	4a. $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$	4b. $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$
Identity Laws	5a. $p \vee F \equiv p$ 6a. $p \vee T \equiv T$	5b. $p \wedge T \equiv p$ 6b. $p \wedge F \equiv F$
Complement Laws	7a. $p \vee \sim p \equiv T$ 8a. $\sim T \equiv F$	7b. $p \wedge \sim p \equiv F$ 8b. $\sim F \equiv T$
Involution Law	9. $\sim(\sim p) \equiv p$	
De Morgan's Laws	10a. $\sim(p \vee q) \equiv \sim p \wedge \sim q$	10b. $\sim(p \wedge q) \equiv \sim p \vee \sim q$

Truth Tables

p	q	$\sim p$	$p \wedge q$	$p \vee q$	$p \rightarrow q$	$p \leftrightarrow q$
T	T	F	T	T	T	T
T	F	F	F	T	F	F
F	T	T	F	T	T	F
F	F	T	F	F	T	T

Rules of Differentiation:

$\frac{d}{dx}(c) = 0,\ c$ **is constant**

$\frac{d}{dx}(x^r) = r\,x^{r-1}$, r **is any real number**

$$\frac{d}{dx}\left[f(x) \pm g(x)\right] = f'(x) \pm g'(x)$$

$$\frac{d}{dx}\left[f(x)\,g(x)\right] = f'(x)\,g(x) + f(x)\,g'(x)$$

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{f'(x)\,g(x) - f(x)\,g'(x)}{\left[g(x)\right]^2}$$

$$\frac{d}{dx}\left[f\left(g(x)\right)\right] = f'\left(g(x)\right)g'(x)$$

Rules of Integration:

Indefinite integral:

$$\int f(x)\,dx = F(x) + c,$$

where c is the constant of integration

Definite integral:

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

$$\int x^r\,dx = \frac{x^{r+1}}{r+1} + c, \quad r \neq -1$$