2.8 Laws of cardinality

Law 8.1 the cardinality of the empty set is 0

$$\#\emptyset = 0$$

Law 8.2 the cardinality of the union of S and T is equal to the cardinality of S minus the cardinality of the intersection of S and T

$$\#(S \cap T) = \#S - \#(S \setminus T)$$

Law 8.3 the cardinality of the union of S and T is equal to the cardinality of S plus the cardinality of T minus the cardinality of the intersection of S and T

$$\#(S \cup T) = \#S + \#T - \#(S \cap T)$$

Law 8.4 the Cardinality of the intersection of S and T is equal to the cardinality of S minus the cardinality of the intersection of S and T

$$\#(S \setminus T) = \#S - \#(S \cap T)$$

2.9 Laws of Power Sets

Law 9.1 Set S is an element of the power set of T if and only if S is a subset of T

$$S \in \mathbb{P}(T) \iff S \subseteq T$$

Law 9.2 the empty set is an element of the power set of a any given set S

$$\emptyset \in \mathbb{P}(S)$$

Law 9.3 for any given set S, S is an element of the power set of itself

$$S \in \mathbb{P}(S)$$

Law 9.4 the power set of set S is equal to two to the power of the cardinality of S

$$\#(\mathbb{P}(S)) = 2^{\#(S)}$$

2.10 Laws of Generalised Operations

Law 10.1 (Generalised Union) for any set of sets A and any element a, $a \in \bigcup A$ if, and only if, there is some set $S \in A$ such that $a \in S$

$$a \in \bigcup A \iff S \in A | a \in S$$

Law 10.2: (Generalised Intersection) for any set of sets A and any element a, $a \in \bigcap A$ if, and only if, for every set $S \in A$ it is the case that $a \in S$

$$a \in \bigcap A \iff \{\forall S \in A | a \in S\}$$