

Practice with tables!

Let $\mathbb{A} = \langle U, V; +, \diamond, \Box, \sqsubseteq \rangle$ be a structure where

- (1) $U = \{a, b\}$, $V = \{p, q\}$,
- (2) $+: U \times V \rightarrow U$ is a binary operation from U and V to U ,
- (3) $\diamond: U \times U \rightarrow V$ is a binary operation from U to V ,
- (4) $\Box: U \rightarrow V$ is a unary operation from U to V ,
- (5) $\sqsubseteq: V \times V \rightarrow \{\top, \perp\}$ is a binary predicate.

Suppose the tables for these structural elements are

x	y	$x + y$
a	p	a
a	q	a
b	p	b
b	q	a

x	y	$x \diamond y$
a	a	p
a	b	q
b	a	q
b	b	q

x	$\Box x$
a	q
b	p

x	y	$x \sqsubseteq y$
p	p	$\top$
p	q	$\perp$
q	p	$\perp$
q	q	$\top$

Create tables for these compound structural elements. If you have time, draw tree representations.

- (1) The interpretation of the term $(x \diamond (x + \Box x))$.

- (2) The interpretation of the term $((x + y) \diamond (x + z))$.

- (3) The interpretation of the predicate $\Box x \sqsubseteq (x \diamond x)$.
(This could be written in prefix notation as $\sqsubseteq (\Box(x), \diamond(x, x))$.)