A Guide for the Potentially Perplexed

Ambiguity

The notation

$$(a\,,b)$$

sometimes refers to the dyad (ordered pair) of a and b, and sometimes to the open interval of real numbers *between* (but not including) a and b. In this paper, an $\in$ sign will reveal that an open interval is meant, as in

$$p \in (0,1)$$

Set notation

Ø **empty set**

$\in$ **element**

$$x_5 \in \{x_1, x_2, \ldots, x_m\}$$

$\cup$ **union**

$\cap$ **intersection**

$\supset$ **proper superset**

$\supseteq$ **improper superset** ("superset-or-equal")

$\subset$ **proper subset**

$\subseteq$ **improper subset** ("subset-or-equal")

$\setminus$ **complementation** ("removing any element also found in")

$$(\{a\,,b,c\,,d\}\setminus\{c\,,d\,,e\,,f\}) = \{a\,,b\}$$

$|\,|$ **cardinality**

$$|\{x_1, x_2, \ldots, x_m\}| = m$$

$|$ "such that"

$$\{a\,|\,(a\cdot b=a)\} = \{0\}$$

Set of (really) natural numbers

$$\mathbb{N}_1 = \{1,2,\ldots\}$$

An interval is a set of real numbers.

open interval: every real number *between* a and b

$$(a, b)$$

every real number greater than a, up to and including b

$$(a, b]$$

every real number from a up to b

$$[a, b)$$

closed interval: every real number from a through b

$$[a, b]$$

The **Cartesian product**

$$\{X_1, X_2, \ldots, X_m\} \times \{Y_1, Y_2, \ldots, Y_m\} = \{(X_1, Y_1), (X_1, Y_2), \ldots, (X_1, Y_n), (X_2, Y_1), \ldots, (X_m, Y_n)\}$$
$$\{X_1, X_2, \ldots\}^2 = \{(X_1, X_1), (X_1, X_2), \ldots\}$$

(This can be generalized to

$$S_1 \times S_2 \times \ldots$$
$$S^n$$

by having sets of *n*-tuples whose *i*-th elements are from the *i*th set.)

The Cartesian set of two intervals

$$(a, b) \times (c, d)$$
$$(a, b]^2$$
(and so forth)

is a set of pairs of numbers (which may be conceptualized as points, but this conceptualization doesn't help for my paper).

A mathematical **relation**[ship] may be conceptualized as a subset of a Cartesian product. For example, for the set of positive integers, the relation $=$ is

$$\{(1,1),(2,2),\ldots\}$$

Thinking of relations in this way, turning them into sets, allows us to apply set operations to them. For example,

$$\geq \;=\; (> \cup =)$$

Symbolic Logic Notation

$\wedge$ **conjunction** ("and")

$\vee$ **inclusive disjunction** ("and/or")

I indicate **negation** ("not") with an overscore

$$\overline{P}$$

implication

$\Rightarrow$ **material implication** ("only if")

$\Leftarrow$ "if only"

$\Leftrightarrow$ "if and only if"

$\exists$ **existential quantifier** ("for some")

$\forall$ **universal quantifier** ("for all")

Some Jargon

"EU" stands for "expected utility", and "SEU" for "subjective expected utility". An *expected utility* model says that an individual will choose a course of actions whose mathematical expectation of utility

$$E(u) = \sum \left[p_i \cdot u(X_i) \right]$$

is highest. A *subjective* expected utility model is one in which the associated probabilities are *measures of belief*, rather than, say, objective frequencies.