SET THEORY - I LINEAR MODELS AND DECISIONS

A SET IS A COLLECTION OF ELEMENTS

THE ELEMENTS ARE SPECIFIED BY EXPLICITLY LISTING THEM, e.g., $\{1,2,3\}$

OR BY SPECIFYING A CONDITION FOR MEMBERSHIP IN THE SET, i.e., $\{x \mid P(x)\}$

THIS READS "THE SET OF ALL x SUCH THAT $P(x)$ [IS TRUE]"

$x \in S$ READS "x IS AN ELEMENT OF (THE SET) S"

ϕ "THE NULL OR EMPTY SET" $\equiv \{x \mid x \neq x\}$ i.e., ϕ = THE SET WITH NO ELEMENTS

TWO SETS ARE EQUAL iff THEY HAVE THE SAME ELEMENTS

$S \subset T$ "S IS A SUBSET OF T" iff $x \in S \Rightarrow x \in T$

$S \cup T$ "THE UNION OF S AND T" $\equiv \{x \mid x \in S \vee x \in T\}$

$S \cap T$ "THE INTERSECTION OF S AND T" $\equiv \{x \mid x \in S \wedge x \in T\}$

$\bar{S}$ "THE COMPLEMENT OF S" $\equiv \{x \mid x \notin S\}$ i.e., x IS NOT AN ELEMENT OF S

$S - T \equiv \{x \mid x \in S \wedge x \in \bar{T}\}$

$\langle x \rangle \equiv \{x\}$

$\langle x_1, \ldots, x_{N-1}, x_N \rangle \equiv \{\langle x_1, \ldots, x_{N-1} \rangle, x_N\}$ i.e., THE ORDERED SET (N-TUPLE) OF $x_1, \ldots, x_N$

$S \times T$ "THE CARTESION PRODUCT OF S WITH T" $\equiv \{\langle x, y \rangle \mid x \in S \wedge y \in T\}$

R IS A RELATION FROM S TO T iff $R \subset S \times T$

R IS A RELATION ON S iff $R \subset S \times S$

$xRy \equiv \langle x, y \rangle \in R$ "x IS RELATED TO y BY R" OR "x AND y ARE R-RELATED", ETC.