

## 1 Overview

Russells paradox (end of ch1) where we say that

$$S_r = \{S \mid S \text{ is a set} \wedge S \notin S\}$$

## 2 Cartesian Products

Two sets, A & B

The *Cartesian Product* of  $(A, B) = A \times B = \{(a, b) \mid a \in A, b \in B\}$

So if  $A = \{4, 3, 6\}$  and  $B = \{\text{circ}, \text{triang}\}$

Then  $A \times B = \{(4, \text{circ}) (3, \text{circ}) (6, \text{circ}) (4, \text{triang}) (3, \text{triang}) (6, \text{triang})\}$

If A and B happen to be finite, then  $|A \times B| = |A| \times |B|$

*n tuples* Given  $A_1, A_2, A_3, \dots, A_n$

The cartesian of these values is  $= \{(a_1, a_2, \dots, a_n) : a_1 \in A_1 \text{ etc}\}$

## 3 Intervals

$$[a, b] = \{x \in \mathbb{R} : a \leq x \leq b\}$$

## 4 Subsets

A is a subset of B  $\iff \forall A \in B$

A is a proper subset of B  $\iff A \subset B$  and  $A \neq B$

The emptyset  $\subset$  of every other set

If  $A \not\subset B$  then  $\exists a \in A$  and  $a \notin B$

Size of empty set = 0, size of set containing only the empty set = 1.

For a set A, the power set of A is  $\wp(A) = \{S : S \subset A\}$

]