week1_lec2

Main Ideas

- Countability and Computability
- Computability of Problems

Countability and Computability

Countability

- 2 kinds of set : Countable and Uncountable
- A Set is countable if we can map a bijection from the set of natural numbers to the set in question. eg: {0,1}*
- If we can't translate a bijection from the set of natural numbers to the set in question, the set is uncountable. Proof is through cantor diagonalization

Computability

- Computers cannot solve all computational issues.
- We can prove through : computational issues >>>>computer applications.

Computer Problems are Uncountable

- A membership inquiry problem can be stated as a computer problem.
- Language is a subset of all potential inputs. Example: Any subset of {0,1}*.

Computer Programs are Countable

- Cardinality(Computational Problems) = Cardinality(({0,1}*)) = Countable
- As long as the axioms of computing stand, no futuristic computer will be able to compute these non-computable problems.

Therefore,

The number of programs is countable and an uncountable number of problems.

computational issues >>>>computer applications.