

Case 13

Why computers are incomplete? Could there exist a more powerful model of computation than Turing machines, on which the current computer are based? What kind of computational model do people represent? Consider these philosophical questions first in the groups. Then you can select your own view point, which you process further. You are given some extra material about these topics.

Consider especially the meaning of the following theorems/theses for the computer science:

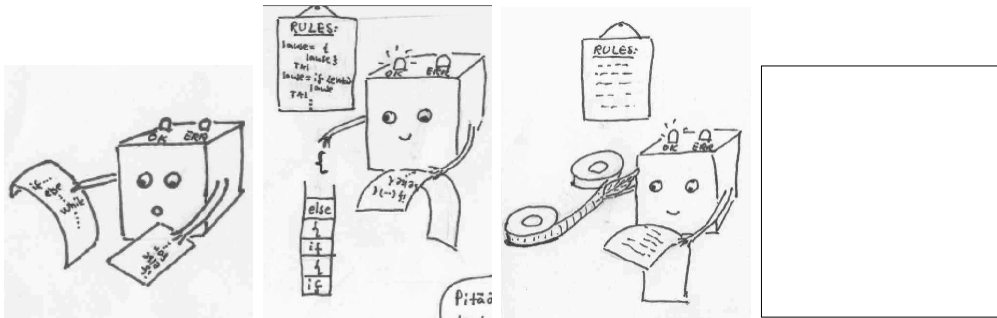
Gödel's Incompleteness Proof

Church-Turing thesis

Rice's theorem

Tarski's theorem

Notice! You may also process the subject by means of comic, poem or tale!



Kuva 1: Imagine, what does the fourth member of the machine family look like!

More information

Gödel's Incompleteness Proof proves that no consistent reasoning system is complete. We can always add the system a true theorem, which still cannot be proved in the system – statement, which says "The statement, whose Gödel-number is x is not provable" and x is selected to be the Gödel-number of the sentence itself.

Church-Turing thesis claims that all solvable or partially solvable problems can be modelled by Turing machines.

Rice's theorem says that all nontrivial semantic properties of Turing machines (i.e. such properties about machine functioning, which hold for some

TM's, but not for all TM's, e.g. "accepts empty string", "computation halts on all input strings" etc.) are unsolvable.

Tarski's theorem states even a stronger thesis than Gödel's theorem: according to it we cannot give even a number-theoretic (logical) formula, which defines the truth of all formulas – not to mention an algorithm. Thus in practice we cannot build even a nontotal Turing machine, which would decide the truth of all logical formula.

About Church-Turing thesis:

http://www.wikipedia.org/wiki/The_Church-Turing_thesis