Turing Machine Subroutines

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Subroutines

Defn. Instead of accepting or rejecting input, does some sort of processing job

→ Can compose larger TM's out of smaller ones

Real vs Ideal computers

Real finite resources - time, memory, disk, etc

Ideal Like regular computer, but doesn't run out of memory

Simulating TM's

Claim 1. Idealized computers can simulate TM's

Need to keep track of
- → finite state-control
- → current state
- → tape head position
- → tape contents

Tape is infinite, but only need "interesting" parts

Claim 2. TM's can simulate ideal computers

TM's can
- → loops
- → functions (subroutines)
- → keep track of natural numbers (on tape)
- → perform elementary arithmetic
- → perform if-else test

} these are basic assembly instructions!!

Church-Turing Thesis. Every effective model of computation is either equivalent to or weaker than a Turing Machine.