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What is an algorithm?

- a sequence of steps that can be used to solve a problem
  - → steps / instructions that can be followed
  - → goal is to solve a problem / do some task.
- often have inputs & outputs
  - → input: something (s) we want to compute something about
  - → output: sometimes explicit / returned, sometimes displayed (e.g., print stmt), sometimes changing a value / manipulating an object.

* it must terminate!

What do you know about analyzing algos.

- time complexity
- space complexity
- count # multiplications

→ asymptotic analysis
  - big-oh notation
  - big theta
  - little o
  - Ω notation

→ exactly: how many "basic" operations does it take?
  - read / write 1 "unit"
  - evaluate a conditional $x < y$ or compare
  - add / sub. / mult / div

(constant-time operations)

- performance
  → evaluating practical runtime vs theoretical
  → if approx. algo, how close does it get?
- correctness
  ① Partial correctness
  "If it terminates, then it is correct."
  ② Termination
  "It terminates."

$P \Rightarrow Q$

P

$\therefore Q$

modus ponens!