

# 1. Algorithms and Computation

What?

- input, output

“What is the input, and what is the output?”

How?

- Algorithm.

What is the input? What is the output?

What is the input? What is the output?

- Input:  $n$
- Inductive Hypothesis: if first  $k$  students contain match alg returns a match before interviewing student  $k + 1$
- Base Case:
  - $n = 0$ :  $n = 0$   $n = 1$   $n = 1$
  - Inductive Step:
    - $k$ :  $k$   $k + 1$

What is the input? What is the output?

- Input:  $n$
- Base Case:
  - $n = 0$ :  $n = 0$   $n = 1$   $n = 1$  (IBM's research computer vs my computer)
- Don't measure time, instead count ops
- Expect performance to depend on size of our input

- $O(n)$  upper bound  $\Omega(n)$  lower bound  $\theta$  both

32 CPU, 32 GB RAM, 32 GB SSD, 32 GB HDD, 32 GB DVD-RW, 32 GB CD-RW, 32 GB Blu-ray Disc, 32 GB Super Multi Drive, 32 GB SATA II, 32 GB SATA III, 32 GB USB 2.0, 32 GB USB 3.0, 32 GB FireWire, 32 GB Thunderbolt, 32 GB DisplayPort, 32 GB HDMI, 32 GB DVI-D, 32 GB VGA, 32 GB Audio I/O, 32 GB LAN, 32 GB Wireless LAN, 32 GB Bluetooth, 32 GB NFC, 32 GB GPS, 32 GB Bar Code Reader, 32 GB Smart Card Reader, 32 GB Fingerprint Reader, 32 GB Face ID, 32 GB Touch ID, 32 GB Eye Tracking, 32 GB Voice Recognition, 32 GB Gesture Control, 32 GB Proximity Sensor, 32 GB Ambient Light Sensor, 32 GB Accelerometer, 32 GB Gyroscope, 32 GB Magnetometer, 32 GB Compass, 32 GB Altimeter, 32 GB Barometer, 32 GB Humidity Sensor, 32 GB Temperature Sensor, 32 GB Pressure Sensor, 32 GB Air Quality Sensor, 32 GB Pollen Sensor, 32 GB Dust Sensor, 32 GB VOC Sensor, 32 GB CO<sub>2</sub> Sensor, 32 GB NO<sub>2</sub> Sensor, 32 GB SO<sub>2</sub> Sensor, 32 GB O<sub>3</sub> Sensor, 32 GB PM<sub>10</sub> Sensor, 32 GB 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