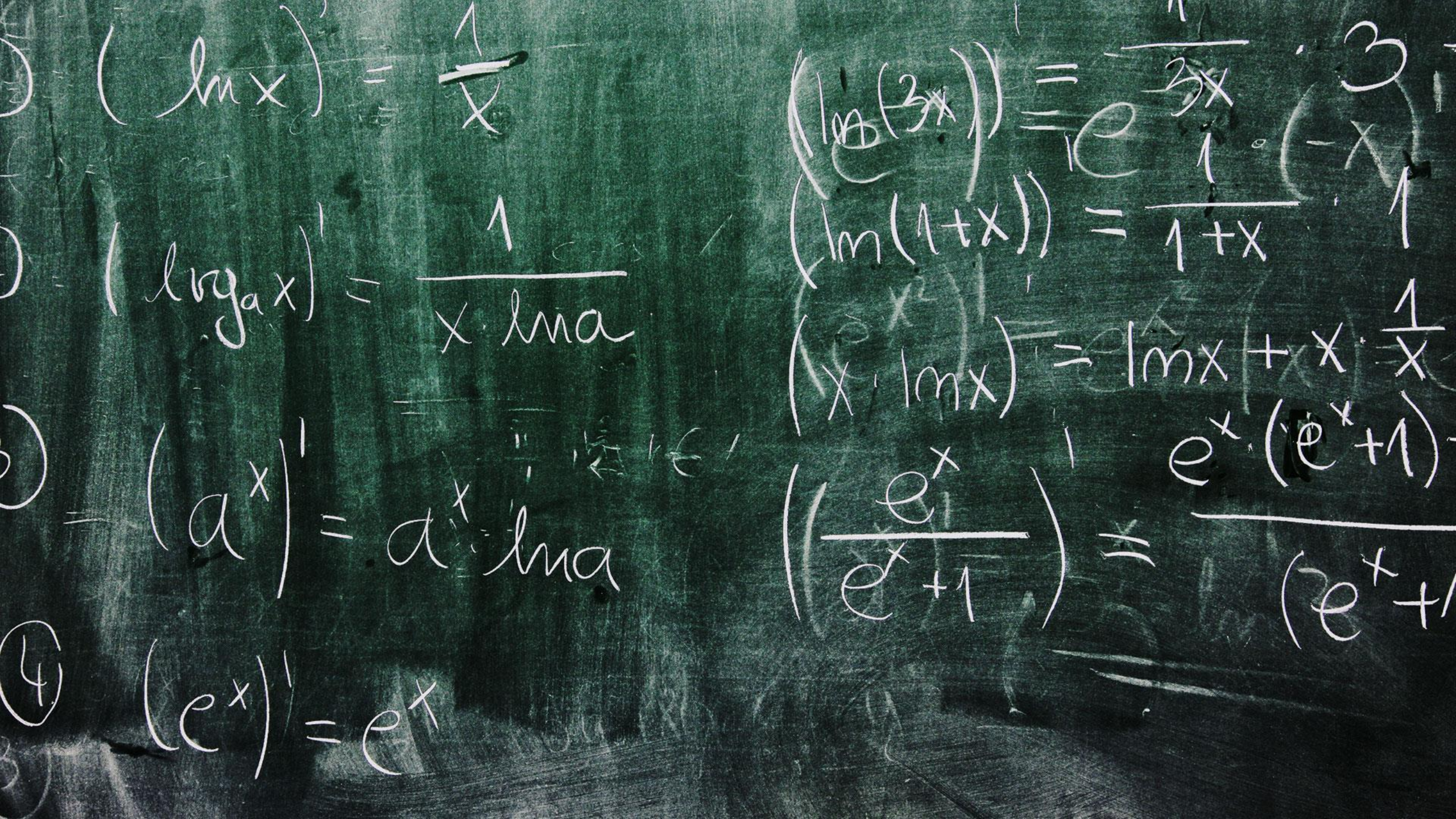
THE DEFINITION OF AN ALGORITHM

Lecture 10

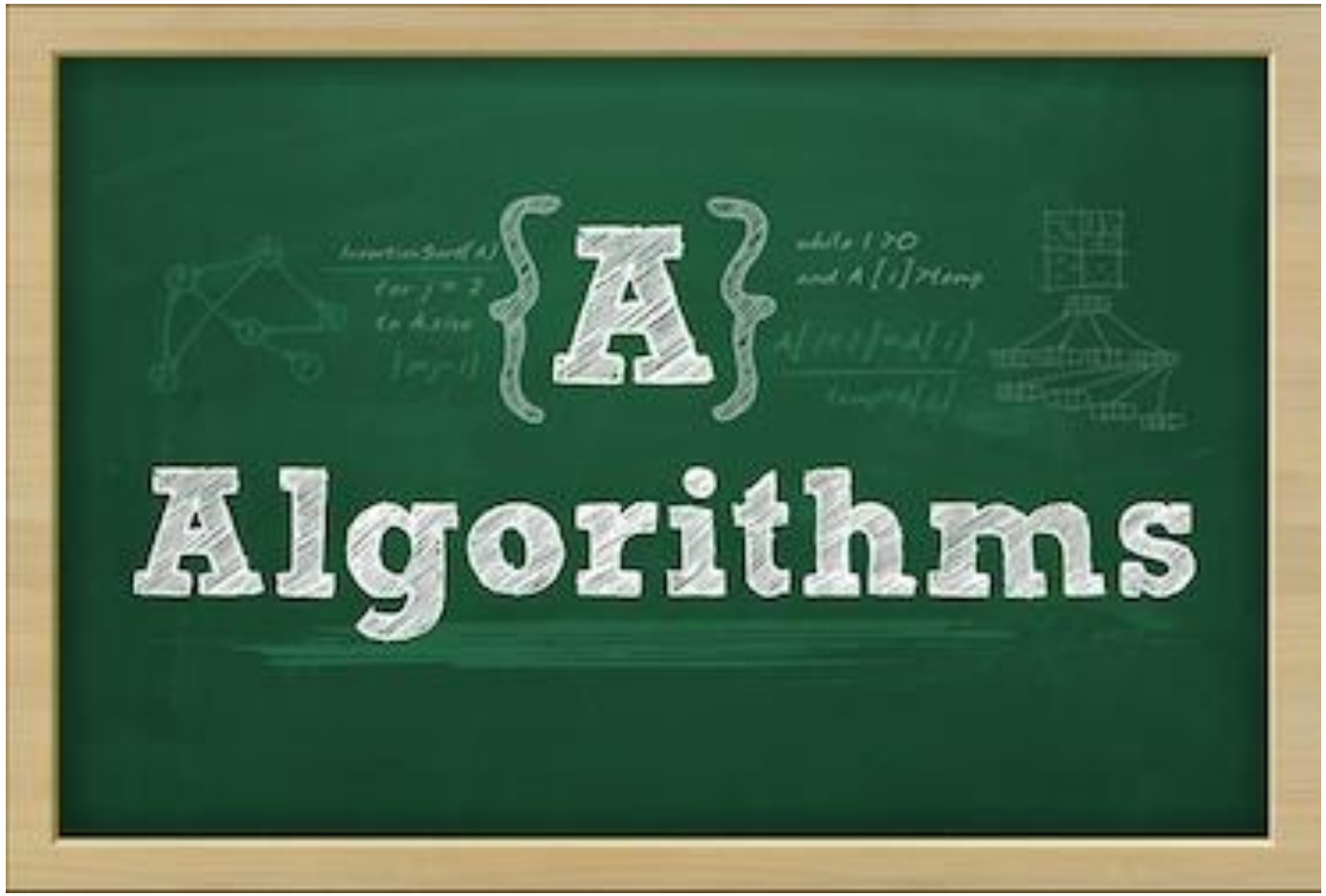

$(\ln x)' = \frac{1}{x}$
$(\log_a x)' = \frac{1}{x \cdot \ln a}$
$(a^x)' = a^x \cdot \ln a$
$(e^x)' = e^x$
$(\ln(3x))' = \frac{1}{3x} \cdot 3$
$(\ln(1+x))' = \frac{1}{1+x} \cdot 1$
$(x \cdot \ln x)' = \ln x + x \cdot \frac{1}{x}$
$\left(\frac{e^x}{e^x+1}\right)' = \frac{e^x \cdot (e^x+1)}{(e^x+1)}$

ALGORITHM

- In mathematics and computer science, an algorithm is a self-contained step-by-step set of operations to be performed.

- An algorithm is an effective method that can be expressed within a finite amount of space and time and in a well-defined formal language for calculating a function.

ALGORITHM



ALGORITHM

- Starting from an initial state and initial input (perhaps empty), the instructions describe a computation that, when executed, proceeds through a finite number of well-defined successive states, eventually producing "output" and terminating at a final ending state.

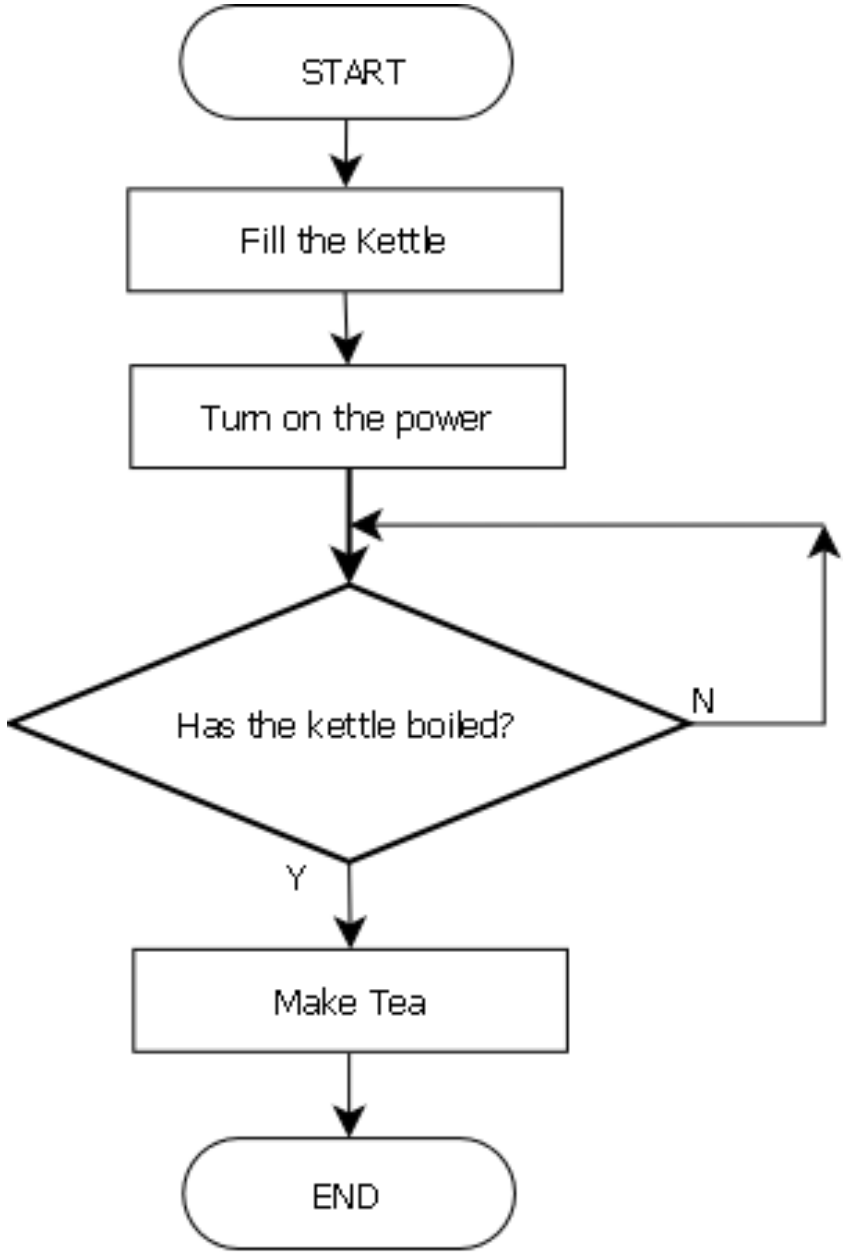
INFORMAL DEFINITION

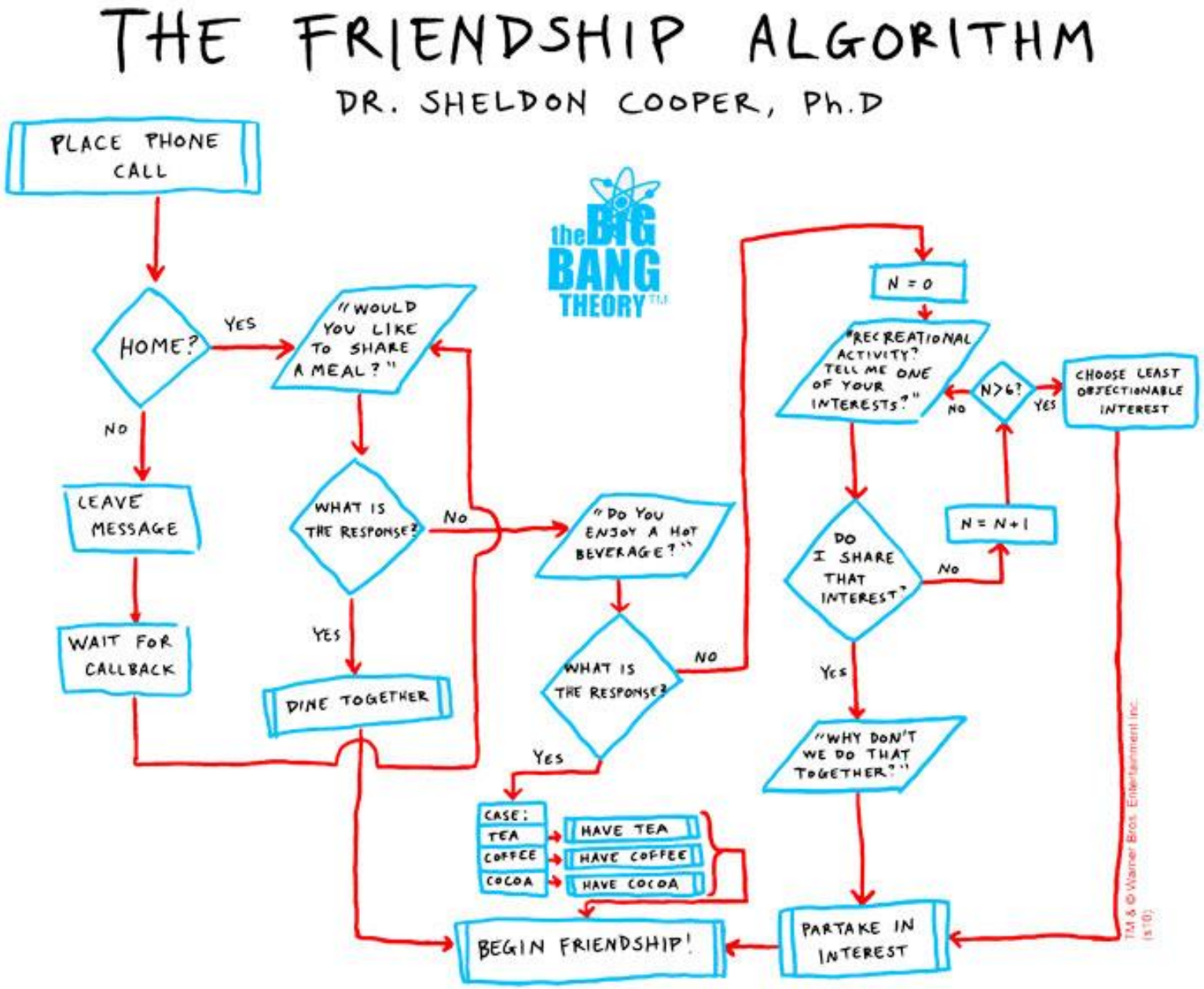
- An informal definition could be "a set of rules that precisely defines a sequence of operations.“

- Algorithms are essential to the way computers process data. Many computer programs contain algorithms that detail the specific instructions a computer should perform (in a specific order) to carry out a specified task, such as calculating employees' paychecks or printing students' report cards.

SOME EXAMPLES

- An algorithm is a series of specific steps that solve a problem or complete a task.



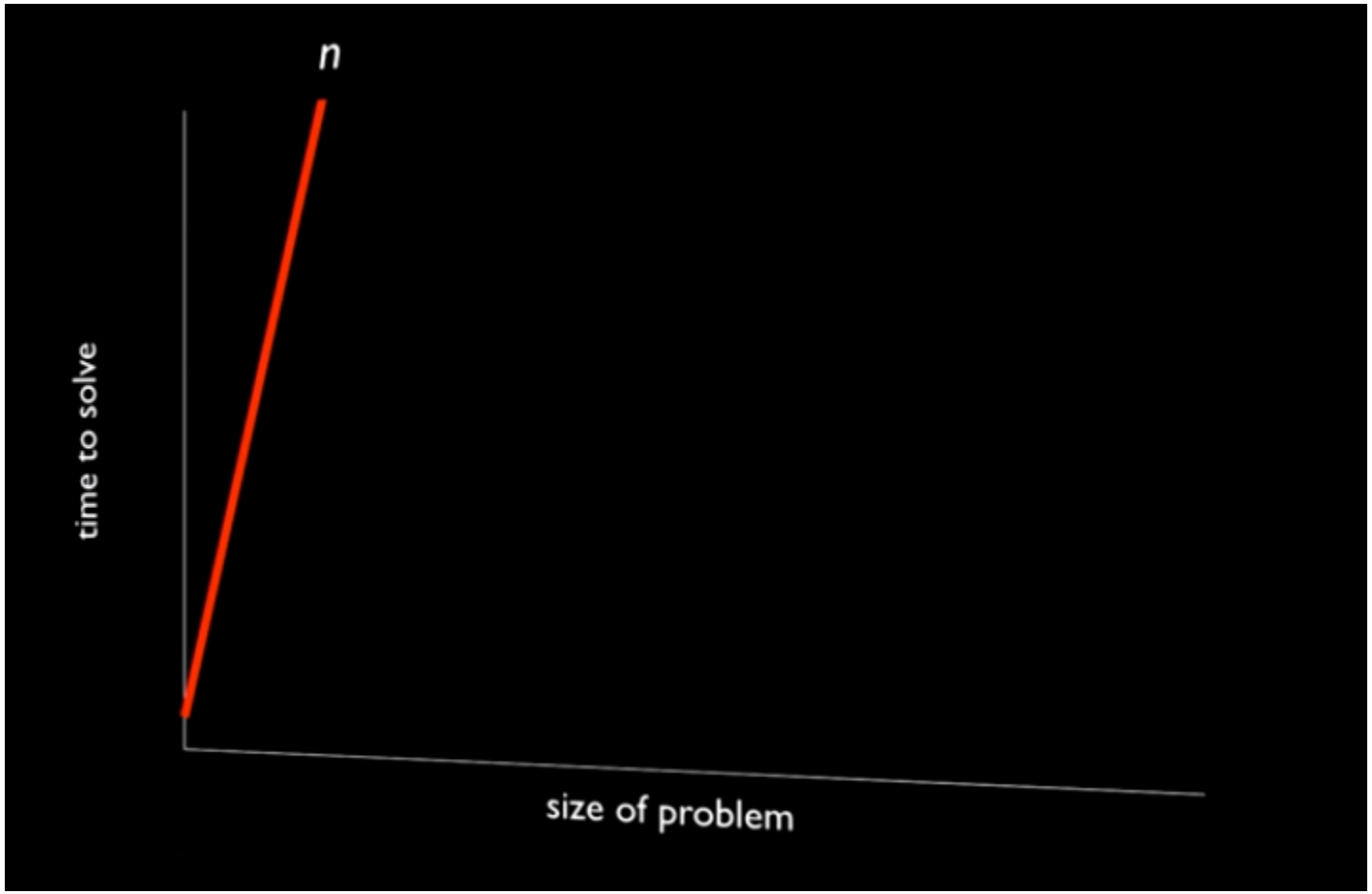

THE FRIENDSHIP ALGORITHM
DR. SHELDON COOPER, Ph.D
PLACE PHONE CALL
HOME?
YES
NO
"WOULD YOU LIKE TO SHARE A MEAL?"
LEAVE MESSAGE
WAIT FOR CALLBACK
WHAT IS THE RESPONSE?
No
Yes
DINE TOGETHER
"DO YOU ENJOY A HOT BEVERAGE?"
WHAT IS THE RESPONSE?
NO
Yes
CASE:
TEA
COFFEE
COCOA
HAVE TEA
HAVE COFFEE
HAVE COCOA
BEGIN FRIENDSHIP!
N = 0
"RECREATIONAL ACTIVITY? TELL ME ONE OF YOUR INTERESTS."
N>6?
NO
YES
CHOOSE LEAST OBJECTIONABLE INTEREST
N = N+1
DO I SHARE THAT INTEREST?
No
Yes
"WHY DON'T WE DO THAT TOGETHER?"
PARTAKE IN INTEREST
TM & © Warner Bros. Entertainment Inc. (s10)

ANOTHER EXAMPLE

- You need to call someone

ANOTHER EXAMPLE

SOME ALGORITHM TO SOLVE THE PROBLEM



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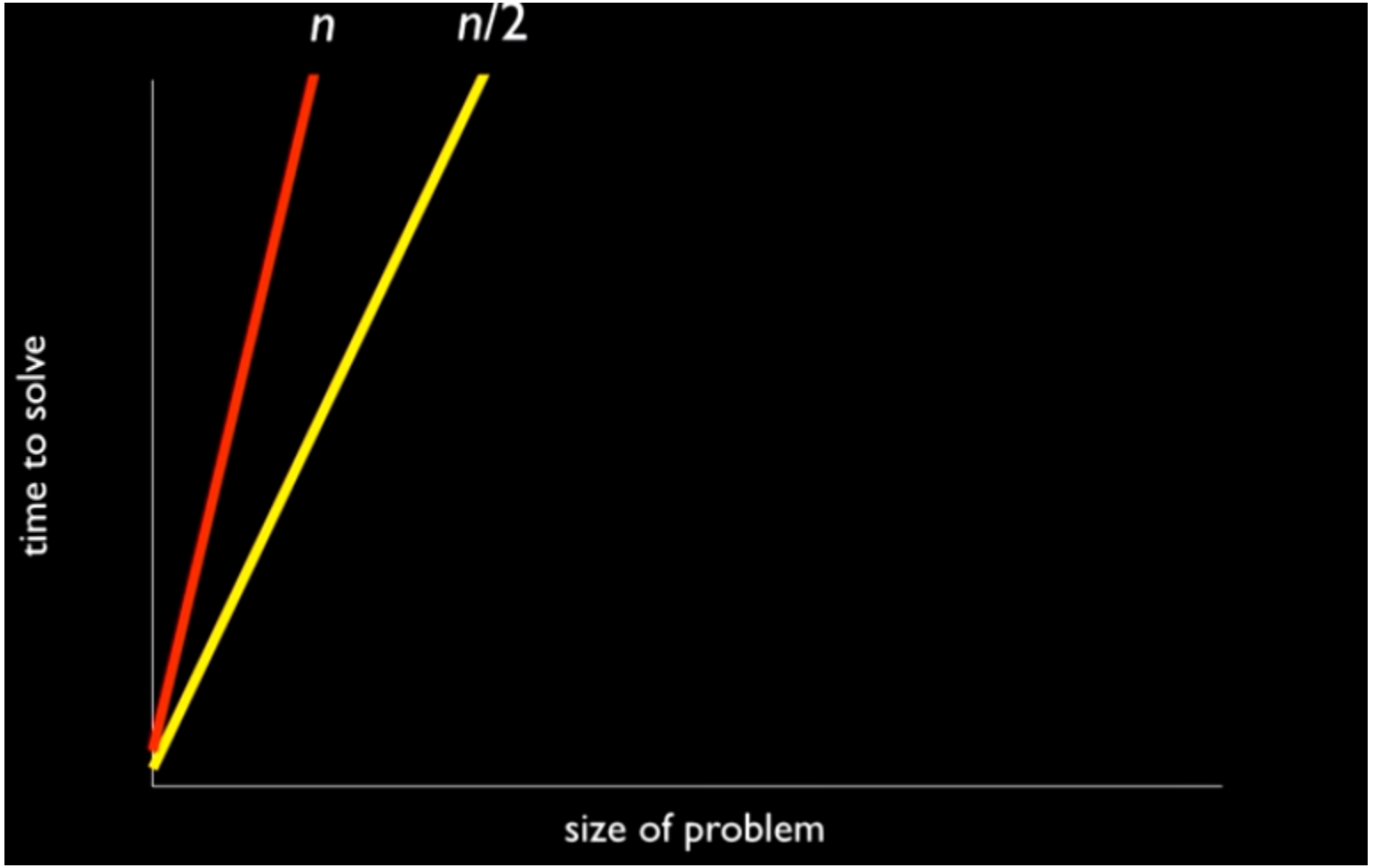

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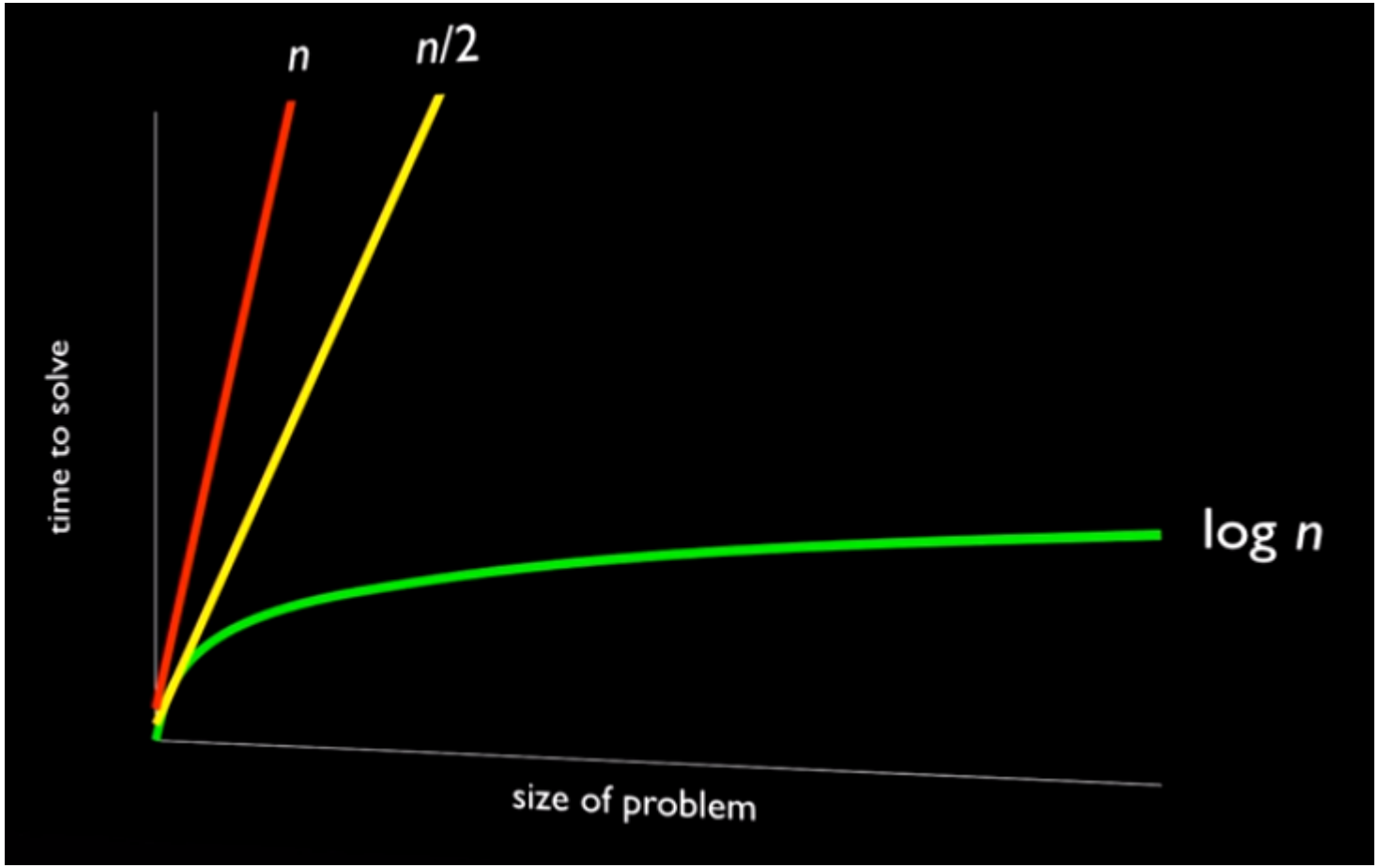

HOME TASKS

1. How can we keep all types of information in binary view?
2. How can we convert from one to another type of information?