MINORITY SERVING-
CYBERINFRASTRUCTURE
CONSORTIUM

In partnership with
INTERNET 2

Atlanta, GA
May 9th - 10th, 2023

CODE
@ MS-CC
STUDENT HACKATHON

TACC
TEXAS ADVANCED COMPUTING CENTER

HACKHPC.ORG

INTERNET 2

omnibond
ORANGEFS · CLOUDYCLUSTER

aws

https://hackhpc.github.io/codeatms-cc23

Computational Thinking

A brief introduction programmatic thinking

PRESENTED BY:

Texas Advanced Computing Center

Objectives

The student will …

- Learn the about the concept of "computational thinking"
- Practice algorithm implementation through abstraction
- Learn about the concept of pseudo code
- Apply computational thinking to the equation for a straight line
- Think outside the "box"

Back when mathematicians were computers and computers were calculators…

- Initially all programming was dedicated to translating math formulas.
- The work lead to the language FORmula TRANslation.

"Computational Thinking is the translation of ideas into computer code" ~Victor Eijkhout

Mathematical Thinking

- Number of people an elevator takes per day
- Speed (velocity) of an elevator
- Distribution of people in an elevator

Computational Thinking

- If there are X # of people expected to use elevators, how many should be installed?
- If someone at floor 0 presses the call button and there are available cars on floors 5 and 9, which car should respond?

The Process of Forming Logic (Think teaching a 3 year-old)

How would you tell a three(3) year old family member to get your keys out of the drawer in your room ?

Requirements, Logic, Algorithms, and Parameters

Requirements - what elements are needed before the job can be taken on

Logic - a system or set of principles underlying the arrangements of elements in a computer or electronic device so as to perform a specified task [an order in which to do a task]

Algorithm - a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer [logic + calculations = algorithm]

Parameters - a limit or boundary that defines the scope of a particular process or activity [limits set on an algorithm = parameters]

What would we need to solve for "y"

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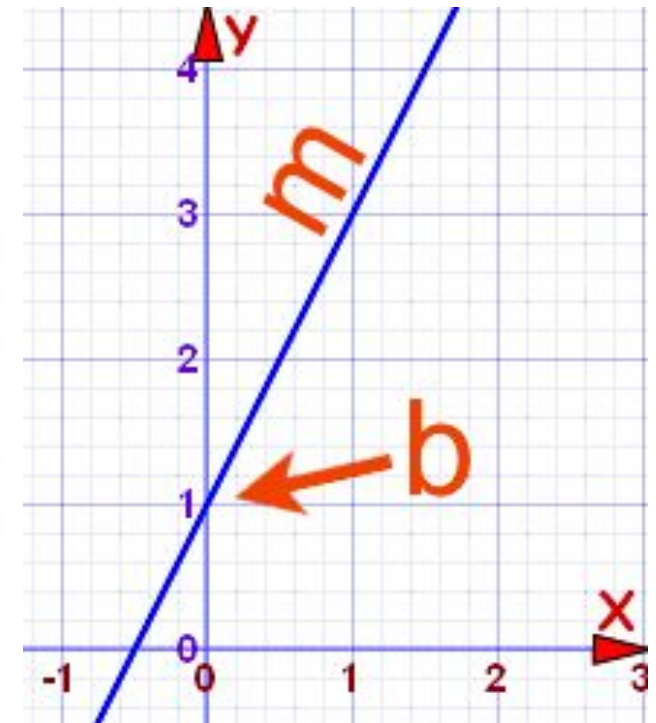
Problem (function):
y=mx+b

Define the **Input** (parameters)

Define the **Output** (parameters)

Define the **Algorithm**

Finding a definition in a dictionary

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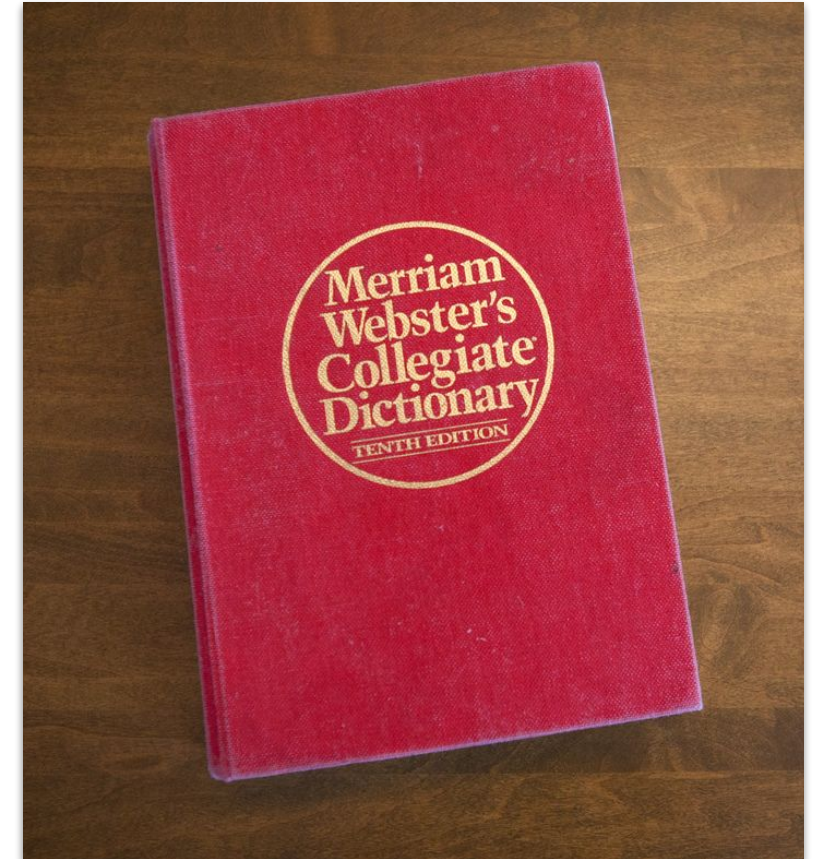
Given (Input):
- Dictionary
- Word (string)

Find (Output):
- Definition

Define your algorithm

Sorting

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Given:

A bag of potatoes

Problem:

Sort the bag of potatoes from smallest to largest

Algorithm:????

IF YOU COULD JUST TELL ME THE BEST ALGORITHM

YEAH THAT'D BE GREAT

memegenerator.net

Making a PB&J Sandwich

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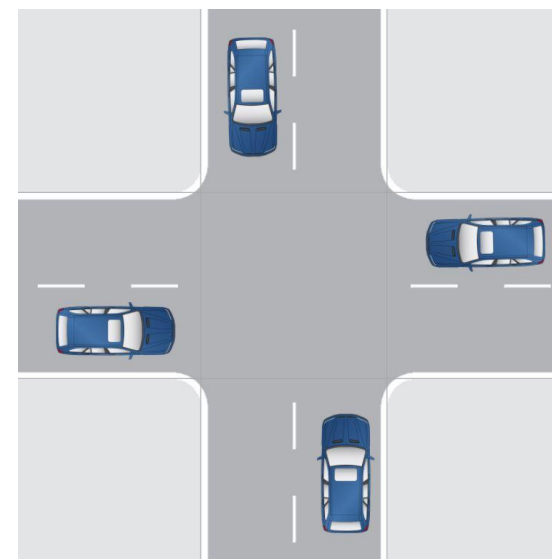
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Problem:

4 automated cars come to an intersection at the same time.

Who goes first?

Algorithm: ???

What decisions did you make?

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What was the last meal you ate?

What were the defining parameters on why you chose that meal?

Where do we go from here?

Look at each problem you are going to tackle, and figure out the requirements - what is needed to solve? Figure out the logic on how to solve it, and apply the algorithm.