

CS1010 Tutorial 1

Admin Matters

Welcome to CS1010 😊

Ground Rules

- Tutorial Attendance is compulsory
 - For me
- (Try to) come on time for class
- Ask me questions during class
 - After class, post questions on **Piazza**

Weightage of Individual Components

Component	Weightage
Post-Lecture Diagnostic Quizzes	10%
Assignments (1-9)	30%
Midterm	10%
PE1	10%
PE2	15%
Finals	25%
Total	100%

General Sensing...

- Prior experience of programming in general?
 - Leetcode, kattis, Euler Project, etc
 - Learnt via internet
- Prior knowledge of **C**?
- For non-CS/CEG/IS/BA/etc students
 - Wants to take more computing modules?

(Hopefully) What will happen today

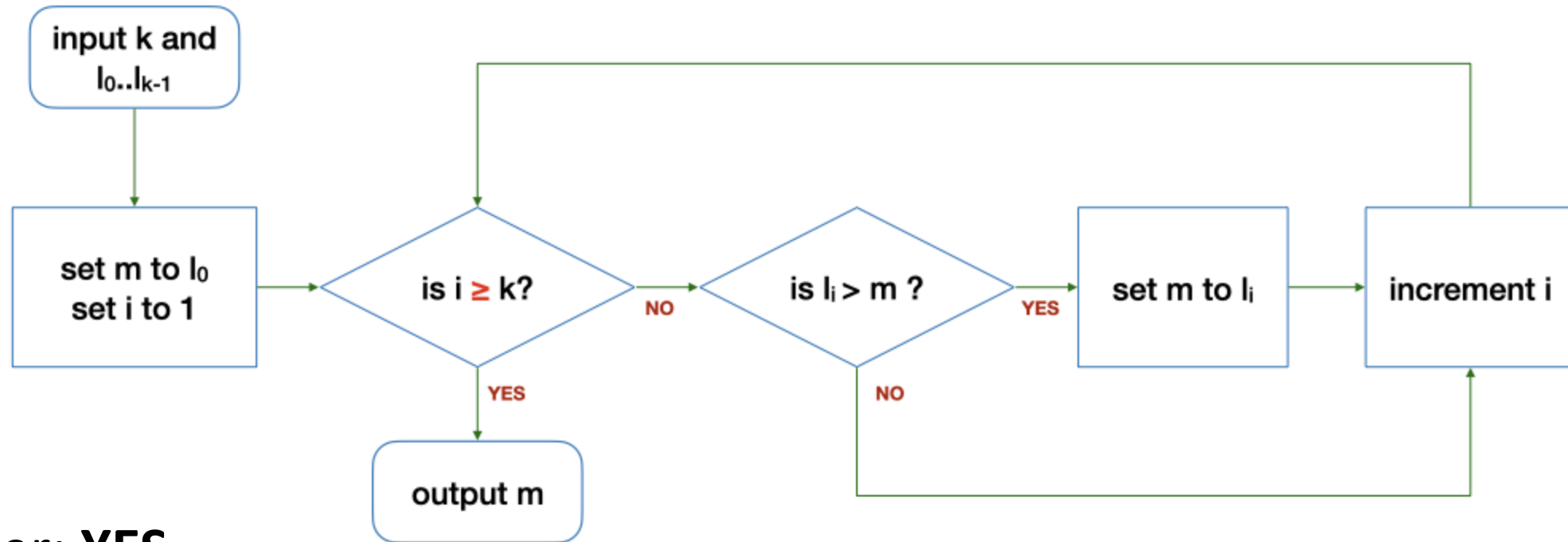
- 1400 – 1410
 - Attendance taking
- 1410 – 1420
 - Admin slides
- 1420 – 1445
 - Problem set 1
- 1445 – end
 - Practical

Problem Set 1

Problem 1.1

- Given a bunch of flowcharts for the *FindMax* algorithm that are *slightly different* from the (correct) lecture version
- Must determine **correctness**
 - No formal proofs, just intuition is fine
- If the algorithm is buggy i.e does not output a correct value for a given input
 - Give a **counter-example** where the output is **incorrect**
 - Give an **input** where the output is **still correct**

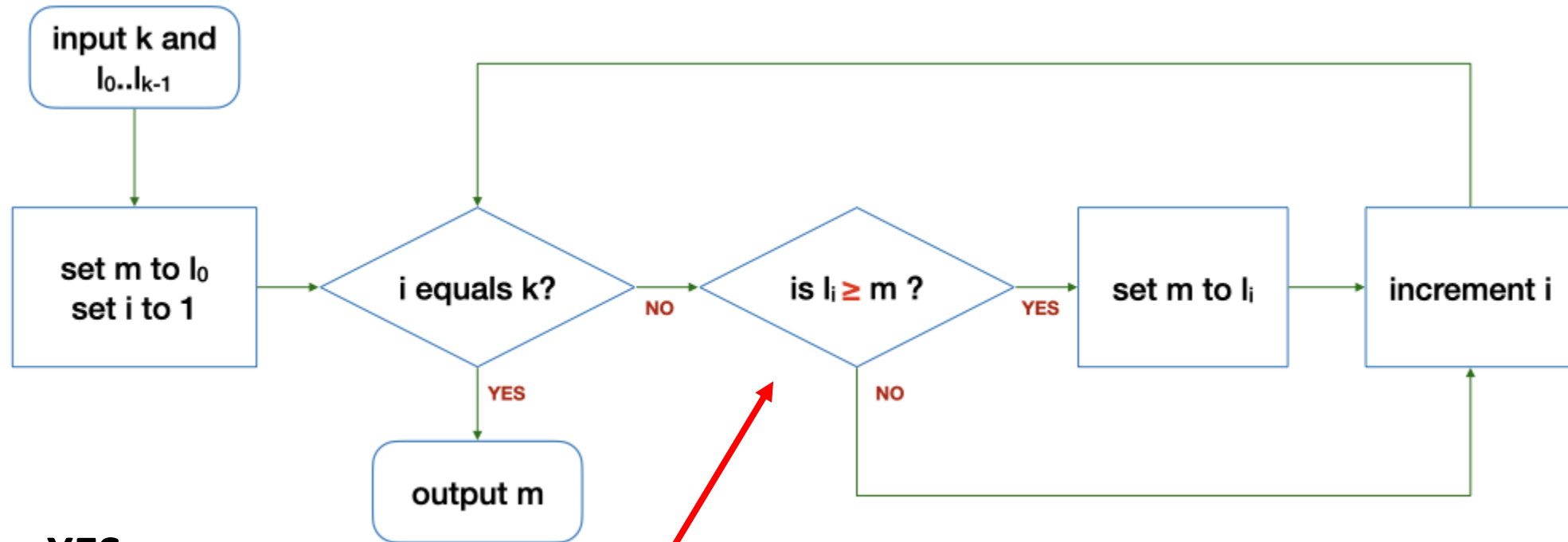
Problem 1(a) – is the algorithm correct?



Answer: **YES**

- At the start of the algorithm, $i \leq k$.
- i is always only incremented by 1 for every iteration of the loop
- i will never be greater than k since the loop always terminates at $i = k$

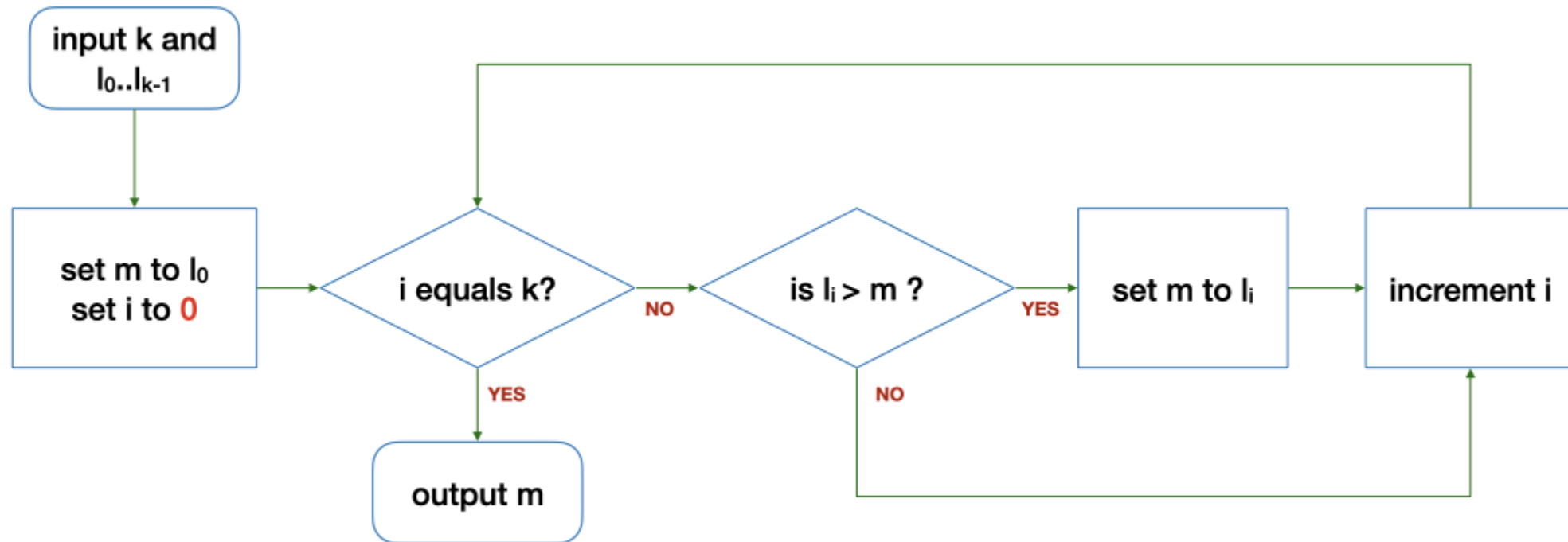
Problem 1(b) – is the algorithm correct?



Answer: **YES**

- Consider the two YES cases at the second diamond
 - Case 1: $l_i > m$
 - Then m is successfully replaced with the larger value, l_i
 - Case 2: $l_i = m$
 - Then m is assigned l_i - result is still correct

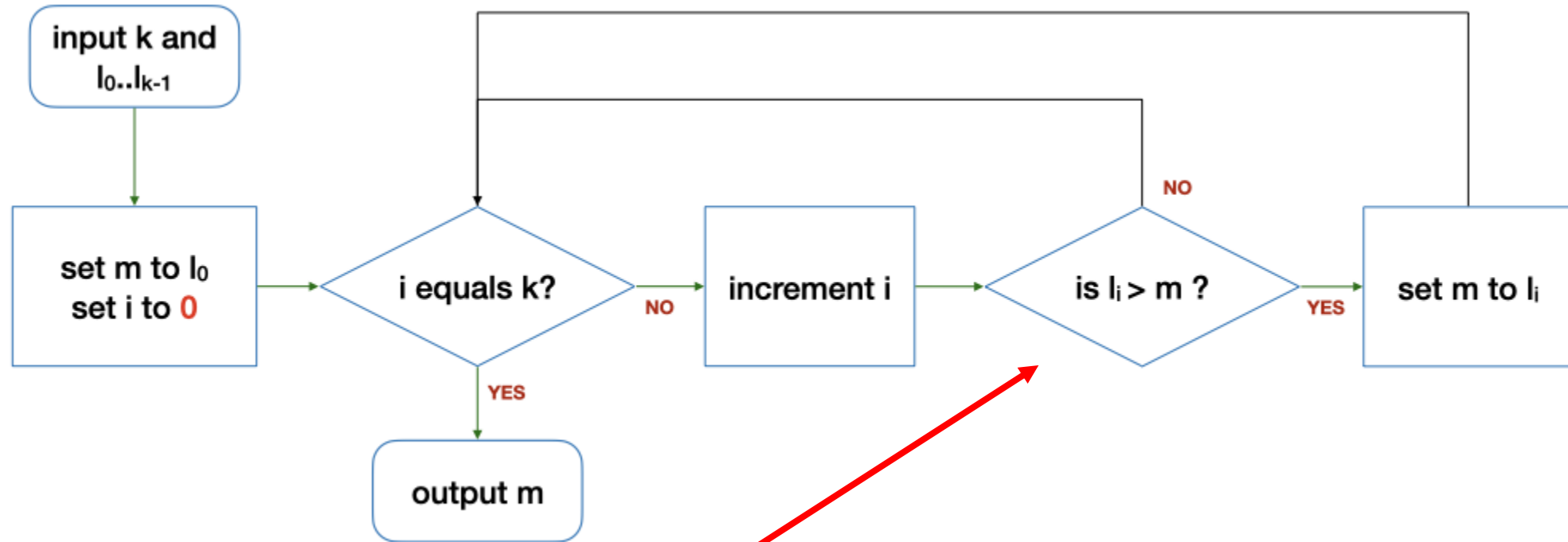
Problem 1(c) – is the algorithm correct?



Answer: **YES**

- Only adds a new (pointless) iteration to the beginning of the loop
- Trace the flowchart:
 - $i = k$? **No**, since $k > 0$, i will never be equal to k on the first iteration
 - $l_i > m$? **No**, $m = l_0$
 - Increment i
 - Now $i = 1$, and the algorithm given in the lecture (which is correct) starts

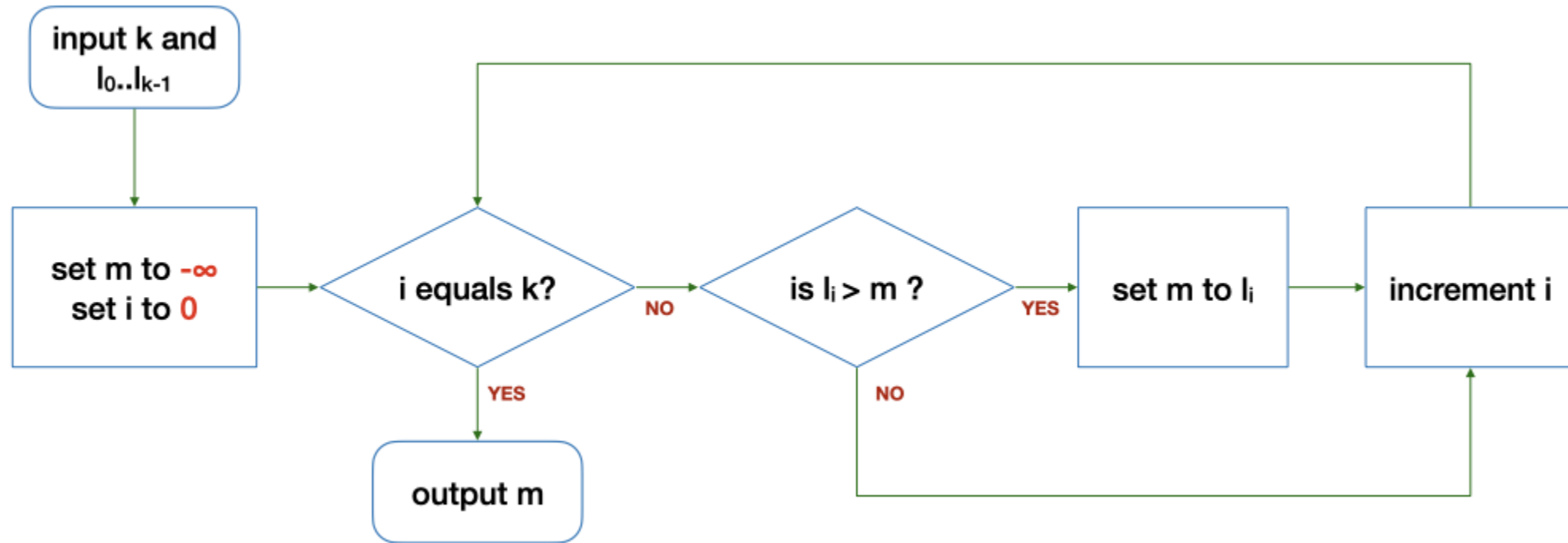
Problem 1(d) – is the algorithm correct?



Answer: **NO**

- Consider an input $k = 1$ and $l = \{1\}$
 - On the first iteration, at the second diamond, $i = 1$
 - What is l_1 ? Remember that here, the list is “zero-indexed”, so the first element is at l_0
 - This bug exists for any list of size k
- **What can be done to make this algorithm correct?**

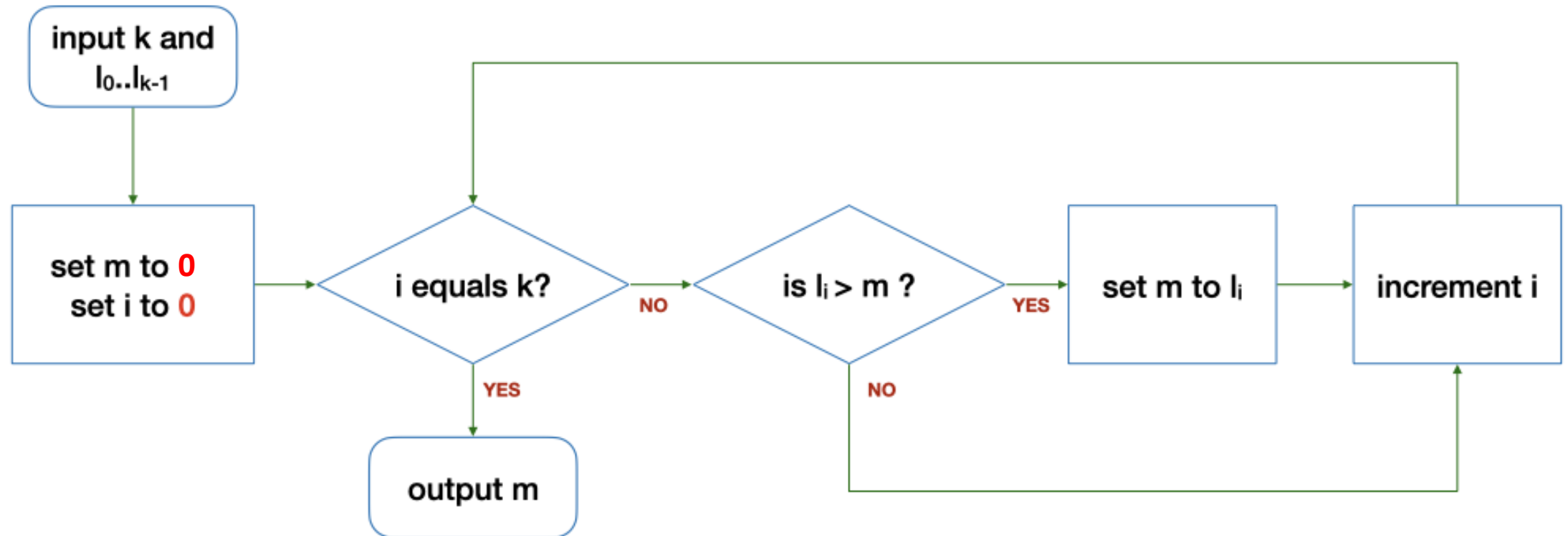
Problem 1(e) – is the algorithm correct?



Answer: **YES**

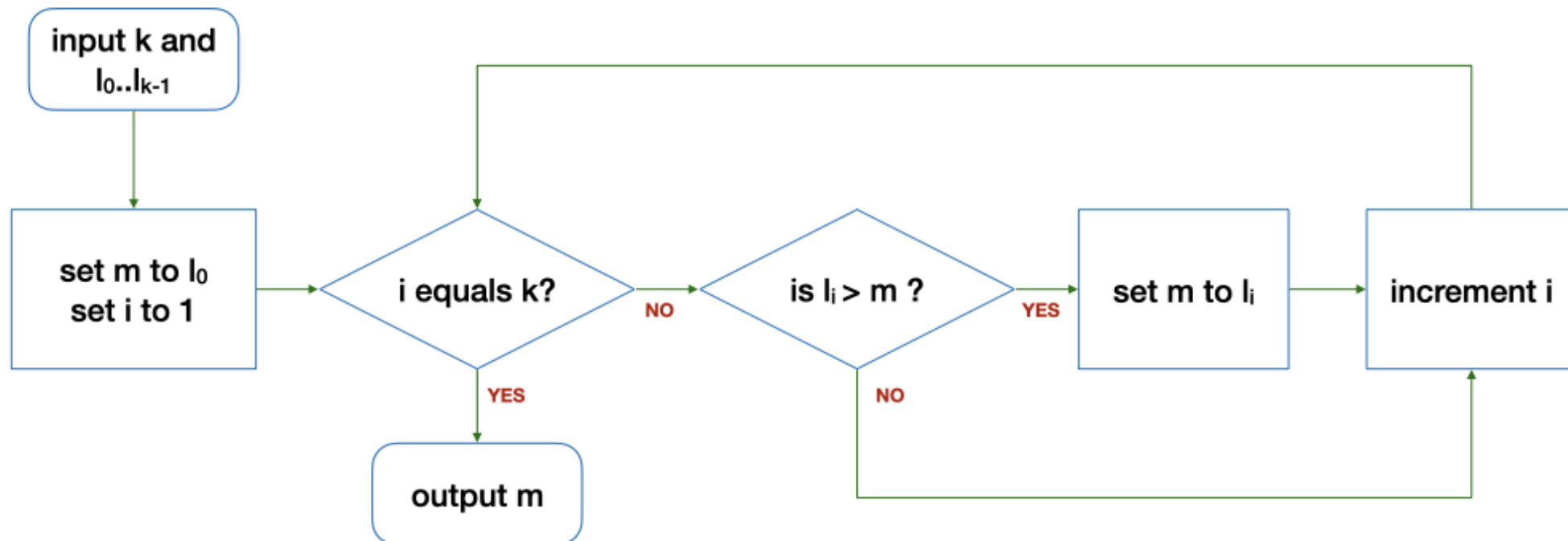
- In algorithmic terms, $m = -\infty$ means that for any value n , $n > m$
- Trace the flowchart for one iteration, now $m = l_0$ and $i = 1$
- Now we have the same algorithm as the one given in the lecture.
- This algorithm works for $k = 0$

What about this one?



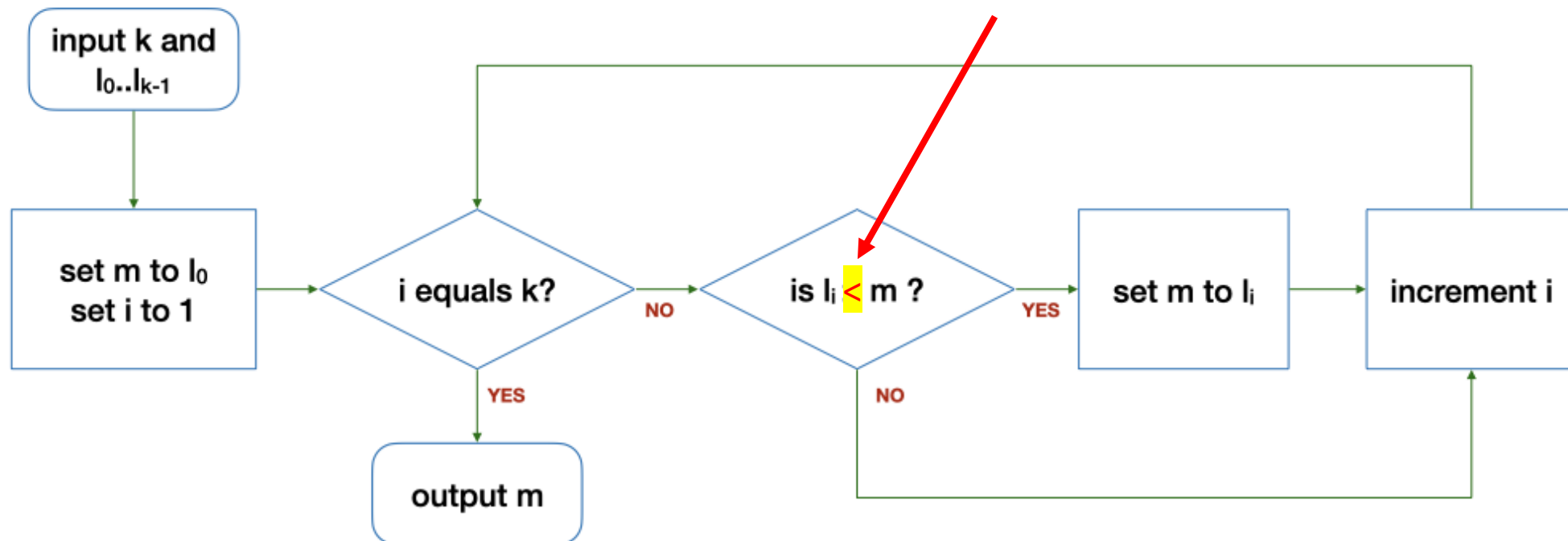
Problem 1.2

- Change the algorithm to find the **minimum value**
- Constraints: $k > 0$, and L is finite



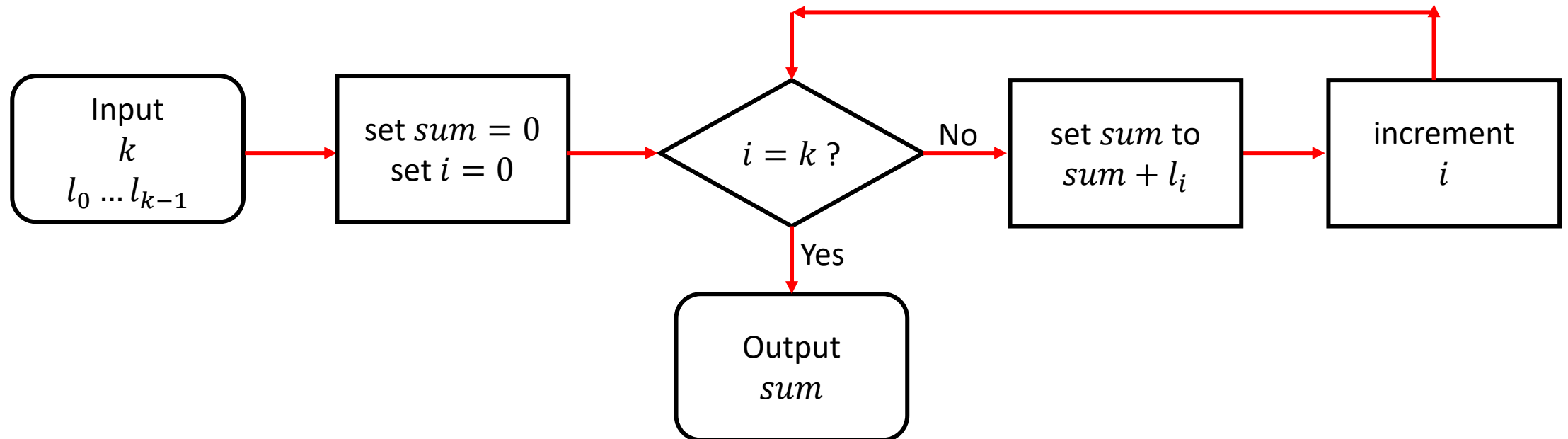
Problem 1.2

- Change the algorithm to find the **minimum value**
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Problem 1.3

- Given $k > 0$, and list L that has k elements, draw a flowchart that computes the **sum** of all integers
 - What variables do you need?



Practical Part

Agenda

- Brief introduction to the Command Line Interface (CLI)
- Logging into PE
- Exercise 1
 - Get exercise 1
 - Write some code, compile, test, etc
 - Submit exercise 1

Command Line Interface

- Before Graphic User Interfaces (GUI), the way to interact with a computer was with a Command Line Interface (CLI)
- An interface where you can write text and commands for the computer to interpret and run
- Benefits
 - no need for UI, everything can be done with keyboard
- Disadvantage
 - big learning curve for newcomers who are used to GUI

Unix CLI

- CS1010 (and further CS classes) **heavily** uses the Unix CLI
 - Very heavily
 - So very heavily
- Even if you're not interested, please learn it for your Practical Exam
- If you plan to take more Computing modules, **you will need the CLI!!!**
- Don't worry, the basics aren't too difficult

Programming Environments (PEs)

- Exercises and Assignments are released **in the PE nodes**
- It doesn't matter which PE node (peXXX) you go into, they're all "the same"

More Sensing

- Set up their SOC Unit Account?
- Read through the Unix CLI tutorial?
- Already managed to log into the PE nodes?

What needs to be done

1. ssh into **PE** node
2. Go through the Unix tutorial
 - You must know – `cd` `ls` `cp` `mv` `rm` `mkdir` `rmdir`
3. Copy `.vimrc` from `~cs1010` using `cp ~cs1010/.vimrc.`
4. Create `.backup` directory in Home folder using `mkdir ~/.backup`
5. Read through Exercise 1 **[This is the main goal for today]**
 1. <https://nus-cs1010-2021-s2.github.io/website/ex00.html>
 2. Edit your `~/.gitconfig`
 3. Retrieve ex0
 4. Write, save, compile some C code
 5. Submit ex0