ASU 101

Introductions
- Class
- Students
- Instructor
- Blog.

ASU
What is Computer Science/Engg.?  
- Some principles
- CS

Algorithm
Set of instr to perform a task
Precise Seq. of instr which terminate & perform the task.
Asu 101 L3.
Computational Complexity

Search Problem:
Given:
- A set (array) \( S \) of \( N \) numbers
- A number \( m \)

Return: true if \( m \in S \)
false if \( m \notin S \)

I: Give an algorithm to solve the search problem.
II: How fast does the algorithm run?

I: Search algorithms:

Linear Search:
for i = 0 to N-1
if S(i) == m
  return true
end for
return false

Worst case running time: \( \Theta(N) \)
Average case running time: \( \Theta(N) \)
“how much time it takes” — “how many basic steps are required.”

**Rationale:**

\[
\text{Time} \sim \text{No of steps \ast time for single step}
\]

**Definition:**

Time Complexity - Number of steps on
Algorithm takes to solve a problem.

Can we do better?

i.e. Does there exist a faster algorithm?

- If the array is unsorted then no!

Argument: Any algorithm will have to examine each number in the set.
in the worst case (in the case when m is not in the array)

the worst case complexity of Search on an unsorted array is \( O(n) \) - the size of the array.

Suppose the array is "sorted" say in ascending order