Linear Search

ALGORITHM 2 The Linear Search Algorithm.

procedure linear search(x: integer, a1, a2, ..., an: distinct integers)
i := 1
while (i ≤ n and x ≠ ai)
    i := i + 1
if i ≤ n then location := i
else location := 0
return location{location is the subscript of the term that equals x, or is 0 if x is not found}

• What is worst case time complexity of this implementation of linear search? (Hint: it is not n.)
Big-O Discussion

For time complexity, we only care about large input sizes, and we only care about the scaling, not the detailed function.

How does big-O notation capture these two desiderata?
1. Prove that \( 7x + 1 \) is \( O(x^2) \). (NOTE: not \( O(x) \)).
2. Prove that \( 10x^2 \) is not \( O(x) \). (Use proof by contradiction.)