Challenge Problem

- Use divide and conquer to find the closest pair of points in a (planar) set in time $O(n \log n)$
Good Morning, Colleagues
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Are there any questions?
Important Points

- Importance of loop invariants
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- Importance of loop invariants
  - Start by identifying the loop invariant
Important Points

- Importance of loop invariants
  - Start by identifying the loop invariant
  - Prove that it’s true at the beginning
Important Points

• Importance of loop invariants
  – Start by identifying the loop invariant
  – Prove that it’s true at the beginning
  – Prove that it stays true
Important Points

- Importance of loop invariants
  - Start by identifying the loop invariant
  - Prove that it’s true at the beginning
  - Prove that it stays true (induction)
Important Points

- Importance of loop invariants
  - Start by identifying the loop invariant
  - Prove that it’s true at the beginning
  - Prove that it stays true (induction)
  - Prove termination
Important Points

- Importance of loop invariants
  - Start by identifying the loop invariant
  - Prove that it’s true at the beginning
  - Prove that it stays true (induction)
  - Prove termination
  - Prove that at termination, the loop invariant leads to a correct result
An Iterative Algorithm

- Prove the correctness of Insertion Sort
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A Recursive Algorithm

- Prove the correctness of Binary Search
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- Prove the correctness of Binary Search
  - What’s your proof strategy?
A Recursive Algorithm

• Prove the correctness of Binary Search
  – What’s your proof strategy?
  – What’s your predicate?
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