

## Algorithm Analysis - CSE 102

Want to distill away detail fluff to determine the  
Essence of Algorithms Performance  $O, \Theta, \Omega$  - notations  
Prove Algorithms Correct / Incorrect through Formal Methods

Algorithm - Computational Process for solving Problems

Analysis : Correctness Proof

Quantity Time & Memory Requirement  
Design for new problems / applications

### The Convex Hull Problem

Given : Set of Points

Result : Convex Hull : Smallest convex polygon containing all points  
Which of Given points is one of the outermost / perimeter points

Gift Wrapping Approach :

- 1 Start @ Extreme (lowest, topmost, etc)
  - 2 Extend out line (as sheet of wrapping paper)
  - 3 Rotate 'Paper' Around Points & pull tight
- All points paper catches are part of convex hull

From start, compute angles to all other pts, smallest → first 'snag'  
Repeat until start is returned to

Time Complexity :  $O(n^2)$  for  $n$  given points

Divide & Conquer :

Split Points into 2 partitions

Solve for each partition

Tangent Connecting Parts is on convex hull