Is Research For Me?

CompSci 18S
Classwork 11
April 18, 2011
Where do you find a research problem?

• ?
Can you find too many research problems?

• Focus on an area
• Narrow your search down
• Don’t work on just one problem
• Still look at other areas – Why?
Now we will examine a research problem from Start to Finish

• Research problem that I solved when I was a graduate student
• We’ll do some problem solving
• We’ll do some thinking about the research process

• Laptops and phones off, no googling for solutions, let’s use our brains for the next hour
First Pick an Area

• Area we picked: Computational Geometry

• This area has led to improvements in computer graphics software and computer-aided design and manufacturing (CAD)

• Visual (geometric shapes) and mathematical
Problem: Dynamic Maintenance of Maximal Points in a Plane

- Points in the x-y plane
- We will calculate which points are maximal
- As the points come and go, we want to be able to quickly list out the maximal points (dynamically)
We have decided on a problem to work on, now where do we start?

• ?
Definition of Maximal Points in a Plane

A point $p_i = (x_i, y_i)$ in the x-y plane is maximal if there is no point $p_j = (x_j, y_j)$ such that $x_j > x_i$ and $y_j > y_i$.
Points in the \((x,y)\) plane, which are maximal points?
Algorithm

• ?
Algorithms? Analysis

• ?
Algorithms? Data Structures?

• ?
Algorithms? Data Structures? (cont)
Take Advantage of Research Opportunities

• [www.cra-w.org/undergraduate](http://www.cra-w.org/undergraduate)
  – Several research programs
    • Summer experience at another university
    • Academic year and summer at your institution

• Students have websites about their experience
Other Research Opportunities

- NSF REU programs
  - Summer programs at other institutions
  - Deadlines in February or early March