Revision (last lecture was a Q/A session)

- Pointer Arithmetic
  - computing locations in 1d arrays
  - computing locations in 2d arrays

- 4 ways to handle 2d arrays
  - as a continuous 1d array
    - int *A;
  - as a 2d array with both dimensions declared
    - int A[M][N]
  - as 2d array with 2nd dimension declared
    - int A[ ][N]
  - as a pointer to pointer
    - int **A;

- when do you use pointers?
  - dynamic allocation and declaration to not happen at the same place
  - returning dynamically created objects/values/arrays
  - use a variable to point to various objects

- why the following code counts 1 string extra?

```c
count=0;

while (!f.eof()) {
    f >> str;
    count ++;
}
```
Sorting

• $A = \{ 3, 1, 10, 22, 4, 2, 178, 11, 29 \}$

• How to sort the array?
keep comparing \( A[i] \) and \( A[i+1] \) and keep swapping if needed
In each iteration, one element will be at its position
→ Bubble sort
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<th>4</th>
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Sorting

```
4 3 1 8 2
3 4 1 8 2
3 1 4 8 2
```
Sorting

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Sorting

4  3  1  8  2
3  4  1  8  2
3  1  4  8  2
3  1  4  2  8
1  3  4  2  8
### Sorting

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Searching through a sorted array

Binary Search

- $A = \{3, 5, 6, 66, 88, 199, 200, 291, 300\}$
- does $A$ have element 291?
- where to start searching?
- we know that the array is sorted
- how to you search a word through a dictionary?
  - do you start from first page always?
Binary Search

Is it the element that we want?
is it smaller than this one?
is it larger than this one?
Binary Search

|  3 |  5 |  6 |  66 |  88 | 199 | 200 | 291 | 300 |

Is it the element that we want? is it smaller than this one? is it larger than this one?
Binary Search

3  5  6  66  88  199  200  291  300

Is it the element?