More Recursion

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Opening Discussion

- Uses of recursion:

    - Graph traversals.

    - Searching solution spaces.

    - Divide and conquer.

    - So much more.

- IcP solutions.

Formula Parsing

- Another one of my favorite recursive algorithms is formula parsing. This allows us to have the user type in a function and our code can evaluate it.

- We do this through "divide and conquer". We split the formula in two across the lowest precedence operator then recursively evaluate the two halves.

- We can use this to put function plotting into our program if we give it the ability to handle a variable.

Recursive Sorts

- Some of the more efficient sorting algorithms are divide and conquer algorithms that are implemented with recursion.

- They divide on the way down, them may or may not do work on the way back up.

- Have O(n log n) average performance.

Merge Sort

- Break in half repeatedly on the way down. Recursively sort on each half.

- Merge sorted parts on the way back up.

- Can't happen in place because merge operation can't be done in one array.

Quicksort

- Can be done in place.

    - Pick a pivot.

    - Move all other elements either before or after the pivot as needed.

    - Recurse on the stuff before and after the pivot.

- Does all work on the way down, nothing on the way up.

- Inefficient List/Vector version is really short.

Minute Essay

- How are your projects coming?