Programming fundamentals with Python

Sorting algorithms - mergesort

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Plan for today

- recursion

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- divide and conquer algorithms

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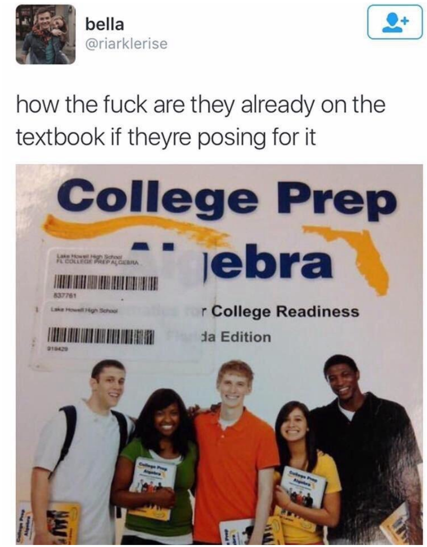
- mergesort

Recursion


bella
@riarklerise

how the fuck are they already on the textbook if theyre posing for it

Recursion is a technique to solve problems in terms of smaller versions of the same problem

Recursion

An example of a recursive algorithm is the calculation of a number in the Fibonacci sequence.
Remember that Fibonacci goes like this:
0, 1, 1, 2, 3, 5, 8, 13...

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Fibonacci

Let's implement the calculation of a number in the Fibonacci sequence using recursion!

Recursion

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Homework

Try implementing the previous function using iteration instead of recursion!

Divide and conquer

From Wikipedia:

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Divide and conquer is a technique used **in algorithmia** in which we split a problem into smaller sub-problems recursively until they're simple enough to be solved directly.

Checkpoint

How is the session going so far? - Do we have questions? - Is there anything that doesn't yet click?

Mergesort

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A question we need to agree on before jumping into the implementation...

- **Is a list of only one element sorted?**

Mergesort

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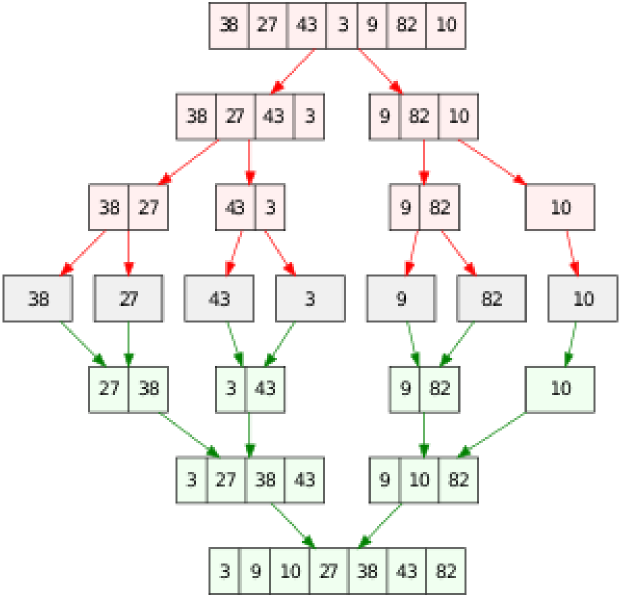
- **Is a list of only one element sorted?**

Yes, it is!

Mergesort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Mergesort

In our mergesort implementation we will have two different functions. **`merge`**, that will just take two **sorted** lists and merge them into a new sorted list, and **`mergesort`**, that will perform the splitting of the list and call **`merge`** on the smaller lists.

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Mergesort

Let's implement mergesort!

Mergesort

What's the worst case runtime for mergesort? Why?