Basic Sort

Write a function that sorts an array of integers.

Use any language and sorting algorithm of your choice.

Tips

- Name the sorting algorithm you're using
- Mention `O(n*log(n))` complexity
- Know how to do:
  - Quicksort
  - Merge sort
  - Bubble sort

Links

https://en.wikipedia.org/wiki/Sorting_algorithm

Insert Ascending

This one is a little trickier. Your input will be a sorted list of integers, along with a new number to insert in the list.

However, the integers will be given to you as a list of their *differences*. That is, `differences[0] == list[0]`, `differences[1] = list[1] - list[0]`, `differences[2] = list[2] - list[1]`, etc. For example, `[1,2,4,8]` would be stored as `[1,1,2,4]`.

Write a function that takes in this list of differences, along with a new number to insert, and returns the new list of differences.

Example

- Input
  - differences: [1, 1, 2, 4]
  - number: 7
- Output
  - [1, 1, 2, 3, 1]

Letter Counts

Some English words contain the same letter more than once, e.g. the word "therefore" contains the letter E three times.

Given a chunk of English text, find the word with the most occurrences of a single letter.

For exaple, with input "O Romeo, Romeo! Wherefore art thou Romeo?" you should return "Wherefore", since that contains three Es.

Tips:

- Ask clarifying questions
  - What to do in the event of a tie?
  - Are capital and lower case letters the same?

Binary Palindromes

Determine whether an input number is a palindrome when represented in binary.

For example, the number `7` is represented as `111`, which is a palindrome, but the number `6` is represented as `110`, which is not.

Tips

- What about negative numbers?
- Two strategies:
  - Convert to string representation
  - Calculate numerically

Longest Common Substring

Given two input strings, find the longest substring common to both strings.

For example, given "ABRACADABRA" and "CADENCE", you should return "CAD".

Tips

- Try a naive solution before worrying about time complexity
- Discuss the big-O complexity of your solution
- Bonus: try for an O(n + m) solution

Longest Path in a Matrix

Given an n by n matrix, find the longest path (moving up, down, left, or right) of numbers, where each number in the path is one greater than the previous number.

Example

```
[
  [6, 5, 3],
  [2, 3, 4],
  [5, 4, 7],
]
```

Should output `[2, 3, 4, 5]`. Other valid paths include `[5, 6]`, `[2, 3, 4]`, `[3, 4, 5]`, but `[2, 3, 4, 5]` is the longest.

Tips

- Discuss big-O complexity

First n Primes

Write a function that will take in a number `n` and return the first n primes, starting with 2

Browser History

Design a class that will record and report a user's browsing history.

Your class should implement the following functions: * `onPageVisit(url)` * `navigateBack()` * `navigateForward()` * `getHistory(numItems)` * If `numItems` is negative, return the previous `numItems+1` pages, including the current page. * If `numItems` is positive, return the next `numItems+1` pages, including the current page. * If `numItems` is 0, return an array containing only the current page.

Tips

- Do we have to worry about history length?
  - Discuss likely memory footprint
  - Discuss options for dealing with long histories
- Don't forget to check array bounds

Reverse Words

Write a function that takes in a bunch of English text, and reverses each word in the text. Words are separated by spaces.

Example

- Input: `Shall I compare thee to a summer's day?`
- Output: `llahS I erapmoc eeht ot a s'remmus ?yad`

Tips

- Discuss big-O complexity
- Can you do it in-place?

Triplet Sums

Given an array of integers and a target sum, output the number of triplets in the array whose sum is <= the target sum.

Example

- Input:
  - Array: [3, -2, 1, 3],
  - Target: 5
- Output:
  - 3 ([3, -2, 3], [3, -2, 1], and [-2, 1, 3] all sum to <= 5)

Tips

- Try a naive soulution first
- Try and get complexity to O(n^2)
- How would you generalize your code to handle n-tuples for arbitrary n