

Write a function `fib()` that takes an integer n and returns the n th Fibonacci number.

Let's say our Fibonacci series is 0-indexed and starts with 0. So:

```
fib(0) # => 0
fib(1) # => 1
fib(2) # => 1
fib(3) # => 2
fib(4) # => 3
...
```

Python ▼

Gotchas

Our solution runs in n time.

There's a clever, more mathy solution that runs in $O(\lg n)$ time, but we'll leave that one as a bonus.

If you wrote a recursive function, think carefully about what it does. It might do repeat work, like computing `fib(2)` multiple times!

We can do this in $O(1)$ space. If you wrote a recursive function, there might be a hidden space cost in the call stack.

Breakdown

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Solution

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Complexity

$O(n)$ time and $O(1)$ space.

Bonus

- If you're good with matrix multiplication you can bring the time cost down even further, to $O(\lg(n))$. Can you figure out how?

- If you're familiar with Binet's formula, then you can calculate any Fibonacci number in $O(1)$. Can you implement that method?

What We Learned

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