Interview Cake

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# Overlapping Subproblems

A problem has **overlapping subproblems** if finding its solution involves solving the *same* subproblem multiple times.

As an example, let's look at the Fibonacci sequence (the series where each number is the sum of the two previous ones—0, 1, 1, 2, 3, 5, 8, ...).

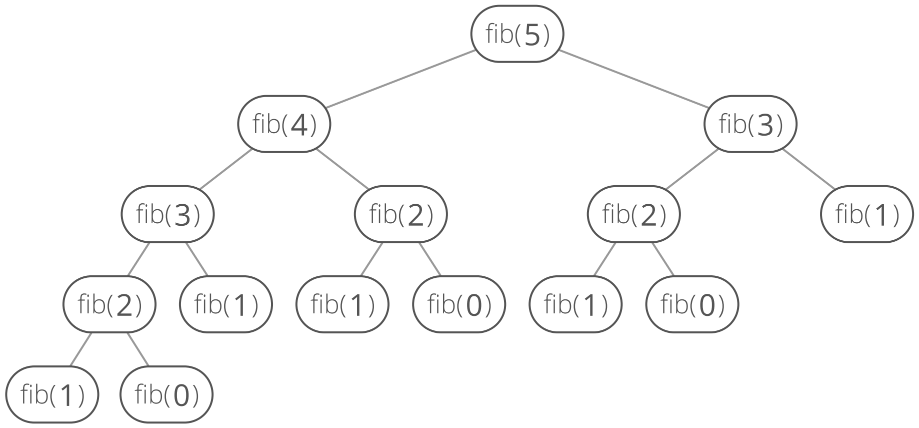
If we wanted to compute the $n$th Fibonacci number, we could use this simple recursive algorithm:

Python 3.6 ▾

```
def fib(n):
    if n == 0 or n == 1:
        return n
    return fib(n - 1) + fib(n - 2)
```

We'd call `fib(n - 1)` and `fib(n - 2)` **subproblems** of `fib(n)`.

Now let's look at what happens when we call `fib(5)`:


fib(5)
fib(4)
fib(3)
fib(3)
fib(2)
fib(2)
fib(1)
fib(2)
fib(1)
fib(1)
fib(0)
fib(1)
fib(0)
fib(1)
fib(0)