FIBONACCI

1, 1, 2, 3, 5, 8, 13, 21, 34...

PATTERN EXISTS <u>ALL</u> OVER IN NATURE

PINEAPPLES

STEMS ON BRANCHES

EVEN A STREET IN UTAH
(SANDY)

$$FIB(n) =$$

$$FIB(n-1) + FIB(n-2)$$

But ...

WHAT ABOUT $FIB(1)$?

We need a start/stop

In Computer Science this

is called the Base Case

Insert <WUB, WUB> here

MATHY DEFINITION

$$\text{FIB}(N) = \begin{cases} 0: & 1 \\ 1: & 1 \\ n: & \text{FIB}(n-1) + \text{FIB}(n-2) \end{cases}$$

```java
public int fib (int num)
{
    IF (num ==0 || num ==1)
    {
        return 1;
    }
    else
    {

        return Fib(num-1) + Fib(num-2);
    }
}
```

$FIB(5) \Rightarrow$

$FIB(4) + FIB(3) \Rightarrow$

$FIB(3) + FIB(2) \qquad FIB(2) + FIB(1) \Rightarrow$

$FIB(2) + FIB(1) \quad FIB(1) \ FIB(0) \qquad FIB(1) + FIB(0) \qquad 1$

$FIB(1) + FIB(0)$

$1 \qquad 1$

ERR....

YUCK

SLOOWW...

WASTE OF RESOURCES

ESP W. BETTER METHODS

MATH: $f_{IB}(n) = \dfrac{(1+\sqrt{5})^n - (1-\sqrt{5})^n}{2^n\sqrt{5}}$

MEMOIZATION:

STORE CALCULATED VALUES &
CHECK FIRST

AKA USE AN ARRAY!?