How do we know recursion works?

```
//Assume i is a nonnegative integer
//returns 2^i.
public int CalculatesTwoToTheI(int i){
      if(i == 0)
            return 1;
      else
            return 2*CaclulatesTwoToTheI(i-1);
}
```

Why does `CalculatesTwoToTheI(4)` calculate 2^4?
Convince the people around you!

More Induction

Induction doesn't **only** work for code!

Show that $\sum_{i=0}^{n} 2^i = 1 + 2 + 4 + \cdots + 2^n = 2^{n+1} - 1$.

Induction

Your new favorite proof technique!

How do we show $\forall n, P(n)$?

Show $P(0)$

Show $\forall k(P(k) \rightarrow P(k+1))$

Making Induction Proofs Pretty

All of our induction proofs will come in 5 easy(?) steps!

1. Define $P(n)$. State that your proof is by induction on n.

2. Show $P(0)$ i.e. show the base case

3. Suppose $P(k)$ for an arbitrary k.

4. Show $P(k+1)$ (i.e. get $P(k) \rightarrow P(k+1)$)

5. Conclude by saying $P(n)$ is true for all n by induction.