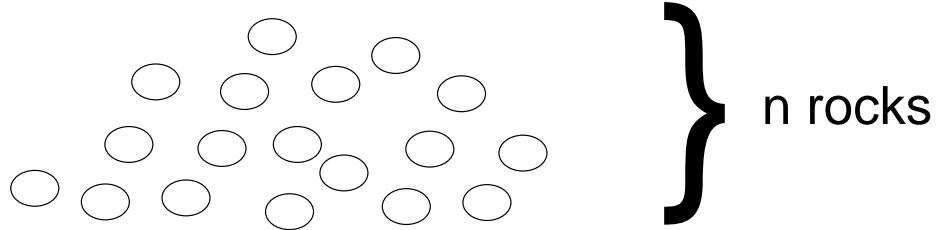


Given a pile of  $n$  rocks (where  $n > 1$ ),  
 compute a number called  $\text{SPLIT}(n)$  in the following way:

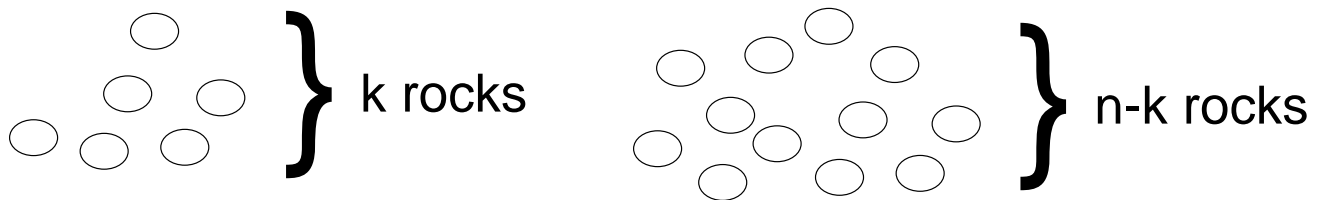
The base case is when the pile has 1 rock;  $\text{SPLIT}(1) = 0$

In general,

given  $n$  rocks,



split the pile into 2 non-empty piles of  $k$  and  $n-k$  rocks.



Then,  $\text{SPLIT}(n) = (k)(n-k) + \text{SPLIT}(k) + \text{SPLIT}(n-k)$

THEOREM:

$$\forall n > 0 \quad \text{SPLIT}(n) = \frac{(n)(n-1)}{2}$$

PROOF: By induction on  $n$ .

Base case:  $n = 1$ .  $\text{SPLIT}(1) = 0 = \frac{(1)(1-1)}{2}$