

# ESO207 Programming Assignment 1

Lakshita Mohanty | 190454 | lakshita@iitk.ac.in

## 1 Navigation in the country

Let us assume that  $A(n)$ ,  $B(n)$  and  $C(n)$  represents the total number of ways in which we can reach Alvonía, Borginia and Carpania after  $n$  days, respectively. We need to write the recursive relations for the same and the base case as well.

We can reach Alvonía only from Borginia and Carpania. Other than these two, there is no other way of reaching Alvonía. To get to Alvonía on the  $n^{th}$  day, we need to be on either Borginia or Carpania on the  $(n - 1)^{th}$  day. Adding the number of ways of reaching Borginia or Carpania on the  $(n - 1)^{th}$  day will give us the total number of ways of reaching Alvonía.

Similarly, we can apply the same logic for reaching Borginia or Carpania on the  $n$ th day. Hence, we can write the final recursive relations as follows:

$$A(n) = B(n-1) + C(n-1)$$

$$B(n) = C(n-1) + A(n-1)$$

$$C(n) = A(n-1) + B(n-1)$$

For the base case, we can deduce as follows. Since we are beginning our journey from Alvonía on day 0, the total number of ways of reaching the same would be exactly 1 (because we are already at Alvonía!). However, we can never reach Borginia or Carpania on day 0 (because we are already at Alvonía!) and hence, the total number of ways of reaching these places would be 0.

$$A(0) = 1; B(0) = 0; C(0) = 0$$