Task 7

Max Team Size 2

In this practice, we will solve a problem using dynamic programming.

i)   You have to climb a staircase with 'n' stairs. At a time, you can either cross 1, 2 or 3 stairs from your current position. When there are no stairs there is only one possible way. Write a function **number_steps(n)** that calculates returns the number of ways you can climb the n steps.

Sample input	Sample output	Explanation
number_steps(3)	Total number of ways to climb the stairs = 4	Possible combination of steps 1 + 1 + 1 1 + 2 2 + 1 3
number_steps(4)	Total number of ways to climb the stairs = 7	Possible combination of steps 1 + 1 + 1 + 1 1 + 1 + 2 1 + 2 + 1 2 + 1 + 1 2 + 2 1 + 3 3 + 1

a)   First write a function that calculates the number of steps in exponential time. Let's call this function **number_steps_expo(n).**

b)   Update your function so that it calculates the number of steps in linear time. Let's call this function **number_steps_lin(n).**

Hint: For the exponential runtime think of a recursive solution and for linear time complexity think of applying dynamic programming approach.