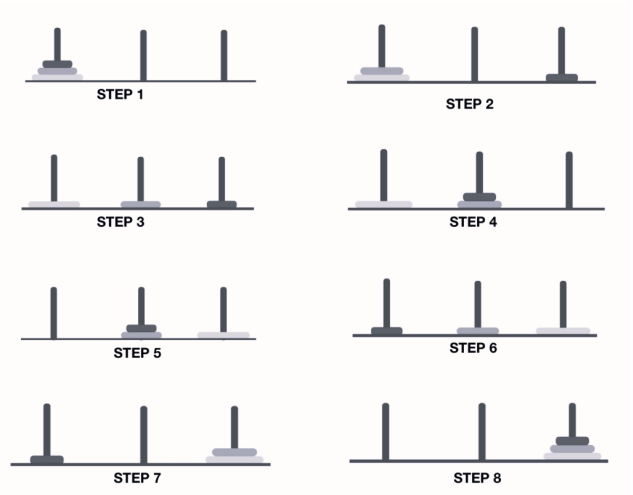
The Hanoi tower

The Tower of Hanoi is a classic mathematical puzzle invented by Édouard Lucas in 1883. It consists of three rods and a set of different-sized disks placed on one rod. The objective is to move all the disks to another rod, while respecting 3 simples rules:

- We can only move one disk at a time
- A larger disk cannot be placed on a smaller one
- The game is finished when the tower is entirely reconstructed on another rod

Solving the puzzle will require multiple methods (iterative/recursive) and as the complexity grows exponentially with the number of disks an algorithmic approach will be essential.

If you want more information you can find some here :
https://en.wikipedia.org/wiki/Tower_of_Hanoi



This project will focus on the development of the towers in python as playable game. The goal for you is to go the furthest possible during the assigned time. We made multiple tasks to help you in the development, some will be necessary to obtain a playable game and some will be considered as options.

First Task

First we have to create a function that will be able to generate and initialize the board for n a number of disks.
We recommend representing the board with a list of lists ([[ ] , [ ] , [ ]]) where each list will be one of the towers.
For the initialization we will add the disk in the first tower. We consider 1 the smallest disk and n the largest.
The number of disks need to be modulable as hanoi tower can be playable for any number of disks given.

Test it

Second Task

To progress correctly we need to be able to display the towers at any given moment.
So we need to create a function that will display the board given the towers.
We can start with something very basic :
[3,2,1]
[ ]
[ ]

And then try to embellish it with for example a real representation of the board in the terminal :

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                    4
          1         5
    3     2         6
_________________________
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(if you wish you can try to represent real disks but be careful one of the options will want you to redo that in turtle)

Third Task

Create a function that will execute a move in the towers based on the towers the source and the destination only if the move respects the rules of the game else ask for another one until the move can be played.

Create a function that will check if the game is over (if the disks are all rightfully placed on the last tower).

Fourth Task

Create the main function that will let the user be able to play the game entirely. The player must be able to choose the number of disks he wants to play with, he also needs to be able to abort the last move he made and quit at any moment.

hint for the cancellation of the last move : you will need to store the moves somewhere to be able to remember them at the next step, maybe a list?

Fifth Task

Add a demonstration option that will integrate the recursive and/or iterative resolution of hanoi.

Peut etre donner plus d'infos dessus ?? genre les formules ou algos?

Options

-Limitation in the number of moves (if the player attain that number he loses)
- register the duration of the game
- calculate a score considering the duration of the games and the number of moves made
- create an option to store, access and show the best scores with the information of the game

Representation Options / Turtle

With the help of turtle , represent the game in a window. You can first focus on the drawing of the board and the towers
Then linking the functions with their graphical associate.

if you can :

- try to make some small animations with turtle to animate the game
- add buttons to have a game completely out of the terminal