Programming for Data Science: Nested loop lab

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Exercise 1

- Write a function that takes an integer **n** as input, and print the following pattern upto **n** lines
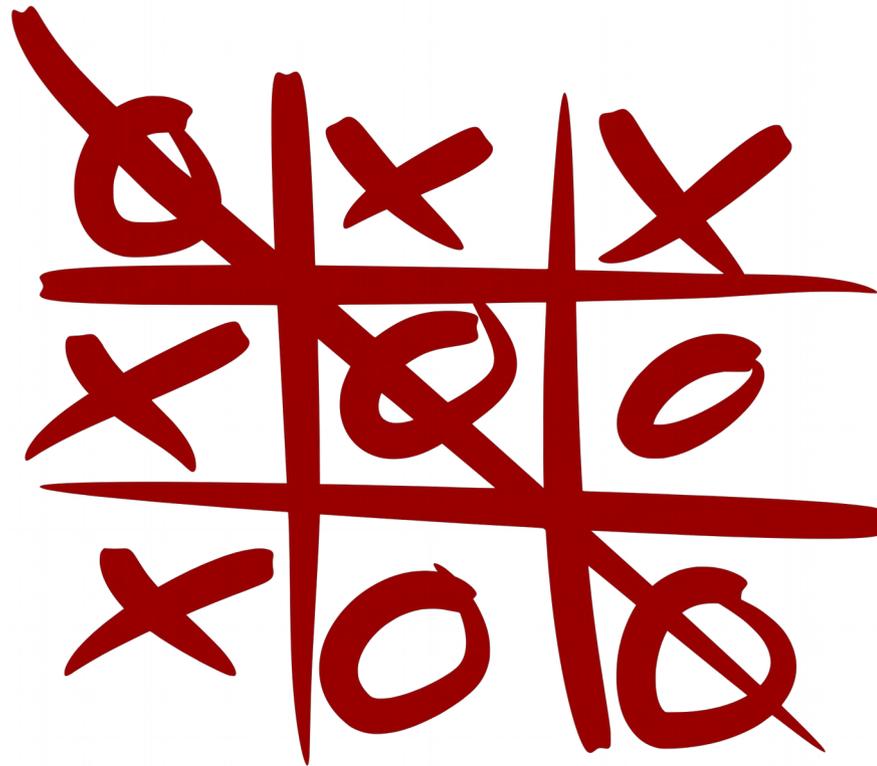
```
1
12
123
1234
12345
```

Exercise 2

- Write another function that takes as input an integer **n** and do the opposite of the previous function, that is

```
54321
4321
321
21
1
```

Exercise 3: Tic-Tac-Toe

- We will try to implement the famous game of Tic-Tac-Toe

Specs

- A turn-based game with 2 players

- The program will ask each player in turn where to make a move

- After receiving input from each player, the program update the board and print the current game state

Game design questions

- How do we represent the board ?

- How do we refer to each square on the board ?

  - 1,2,3,4...9 or (1,1),(1,2),(1,3),(2,1),(2,2)...

- How do we represent a move by a player ?

  - 'X' or 'O' or what ?

The board

- We could use list to represent board's state
- List in Python is a collection of objects
- List can be constructed using square brackets
  - A = [1,2,3,4,5] or
  - B = ["a", "b", "c", "d"]
- List is string's cousin
  - Element can be accessed by A[index]
    - Eg., A[0] is 1, B[3] is "d"
  - List is mutable
    - B[3] = "z" → B is now ["a","b","c","z"]

Our board

- We will use list to store board's state

  – board = [0, 0, 0, 0, 0, 0, 0, 0, 0]

- Zero represents empty cell

- 'X' may represent one player and '0' the other

Exercise 3.1

- Define a board and

- Write a function named print_board() to print current board's state

- Example

        0 0 0
        0 0 0
        0 0 0

Exercise 3.2

- Write a function which takes as input a character representing player and an integer representing a cell, and simulate a move

- We may consider indexing a cell by number 1 to 9

<div align="center">

1 2 3

4 5 6

7 8 9

</div>

- Your function should modify board's state

Exercise 3.2 (cont)

- Suppose your board is
  - board = [0, 0, 0, 0, 0, 0, 0, 0, 0]
- move('x', 3)
- The board will be
  - board = [0, 0, 'x', 0, 0, 0, 0, 0, 0]

Exercise 3.3

- Write the game's main loop which

    - Print current board's state

    - Ask for a move from player 1

    - Print current board's state

    - Ask for a move from player 2

    - And so on…

    -

- How many times the main loop repeats ?