Game Challenge

Connect four

Connect four (also known as Captain's Mistress, Four Up, Plot Four, Find Four, Four in a Row, Four in a Line, Drop Four, and Gravitrips) is a popular children's game. As the name suggests, the player who can get a straight row of four chips (horizontally, vertically or diagonally) wins the game. For this, the players chose one of seven slots to insert their chip into. The chip then falls to the bottom of the slot or until it hits another chip in that slot. Each slot has a maximum of six chips.

In this challenge you will implement the game for two players. For this we need to represent and check the playing field in Python.

On the right you can see a typical travel variant of the game. In the shown case red won.

Try to solve each challenge without looking at the hints, but feel free to use whatever else information source. If you feel a bit stuck look at the hint. If you are still stuck, do not hesitate to reach out to one of the trainers. After finishing one of the challenges, you might find it useful to also reach out to one of the trainers to discuss it.

If you cannot finish it all, that does not matter. If you want to you can finish it at home. If you need help or have your answers checked, you can reach out to us at an time later.

Enjoy the challenges!

Challenge 1

Find a way to represent the playing field in Python and print it out, such that the players know where their and the enemies chips are and which places are still empty.

Hint 1.1

Search for '*nested lists in Python*'.

Hint 1.2

Read the first section of lesson 9 on snakify.org.

Hint 1.3

Use the number 0 for an empty slot, 1 for a chip of player one and 2 for a chip of player two.

Challenge 2

Alternatingly allow the players to select a slot (enter a number from 1 to 7). Change your playing field to represent the new chip. Don't forget the gravity of the situation; move it all the way down, until it hits the bottom or another chip.

Challenge 3

For a given location, check if there is a chip. If there is one, check if this is part of a row of four (same player as the initial one!). *Note:* You only need to check the three slots to the right, bottom and the diagonal to the bottom-right. You will understand why later.

Hint 3.1

Write one function for each check. Pass the playing field and the starting point. Then return 0 for no complete row, 1 for a row of four for player one and 2 for a row of player 2.

Challenge 4

Now perform this check for all fields after each added chip, declare a winner if you find a row of four and end the game. *Well, actually;* do you need to check all fields?

Challenge 5 (Bonus)

Research the library `numpy` and translate all nested lists into numpy-arrays.

Challenge 6 (Bonus)

Implement one of the rule variants.