Testprotokoll für GameCheck.py

19 11 2016

Beschreibung des Moduls

Das Modul GameCheck beinhaltet eine Klasse, welche den Zustand des aktuellen Spiels überprüft. Das bedeutet, dass überprüft wird, ob das aktuelle Spiel mit den gegebenen Konstellationen bereits beendet ist, da einer der beiden Spieler gewonnen hat.

Test der Klasse "GameCheck"

Die Klasse GameCheck besitzt folgende strukturelle Form:

```
GameCheck
- currentGameField: int[*][*]
+ init(currentGameField: int[*][*])
+ is_game_finish() : int {0..2}
- __check_for_win_cf(playerSign: int, cuttedGameField: int[*][*]) : Bool
```

Test der Methode " check for win of"

Da diese Methode keine andere Funktion oder Routine aufruft kann der Startpunkt des Tests hier definiert werden.

Für den Test wird das so genannte Black-Box-Prinzip genutzt. Man überprüft also die Ausgabe der Routine für bestimmte Wertebereiche.

Die Methode überprüft, ob ein spezifischer Spieler für eine bestimmte Spielfeldkonstellation gewonnen hat.

Der Algorithmus wird einmal mit einem besonders großen Spielfeld von 20 x 20 und einmal mit einem besonders kleinen Spielfeld 4×4 getestet.

Die Spielfelder werden jeweils mit allen möglichen Siegkombinationen und Verliersituationen belegt und an den Algorithmus übergeben.

Die Testergbenisse sollten bestenfalls folgendermaßen ausfallen:

Sei B die Belegung des Algorithmus __check_for_win_of, playerSign der Spielstein, mit welchem der Test durchgeführt wird, Siegkombination ein Spielfeld, mit welchem die Überprüfung zu einem Sieg führt und Verliersitutation ein Spielfeld, mit welchem die Überprüfung zu keinem Sieg führt.

B(playerSign, Siegkombination) ---> True

B(playerSign, Verliersituation) ----> False

Testergebnisse

Das Skript, welches die Ergebnisse generierte findet man im Verzeichnis tests

Ergebnis für n = 4

Occupied fields : [0 , 0] [1 , 0][2 , 0][0 , 1]>
True	
Occupied fields : [0 , 1] [1 , 1][2 , 1][0 , 2]>
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Occupied fields : [3 , 1] [2 , 1][1 , 1][3 , 2]>
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Occupied fields : [0 , 1] [1 , 1][0 , 2]> False
Occupied fields : [0 , 2] [1 , 2][0 , 3]> False
Occupied fields : [0 , 3] [1 , 3][0 , 2]> False
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Occupied fields : [1 , 0] [0 , 0][1 , 1]> False
Occupied fields : [1 , 1] [2 , 1][1 , 2]> False
Occupied fields : [1 , 1] [0 , 1][1 , 2]> False
Occupied fields : [1 , 2] [2 , 2][1 , 3]> False
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Occupied	fields			2		1			1		1		2		2			False
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Occupied Procedure	fields			2		2			1		2		2		3			False
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Ergebnis für n = 20

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Occupied fields : [ 6 , 4 ] [ 5 , 4 ][ 4 , 4 ][ 6 , 5 ] ---->
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Occupied fields : [ 6 , 5 ] [ 7 , 5 ][ 8 , 5 ][ 6 , 6 ] ----->
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Occupied fields : [ 6 , 5 ] [ 5 , 5 ] [ 4 , 5 ] [ 6 , 6 ] ---->
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Occupied fields : [ 6 , 6 ] [ 7 , 6 ][ 8 , 6 ][ 6 , 7 ] ----->
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Occupied fields : [ 6 , 6 ] [ 5 , 6 ][ 4 , 6 ][ 6 , 7 ] ---->
True
Occupied fields : [ 6 , 7 ] [ 7 , 7 ][ 8 , 7 ][ 6 , 8 ] ----->
True
```

```
Occupied fields : [ 6 , 7 ] [ 5 , 7 ][ 4 , 7 ][ 6 , 8 ] ----->
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Occupied fields : [ 6 , 9 ]
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Occupied fields : [ 6 , 10 ] [ 5 , 10 ][ 4 , 10 ][ 6 , 11 ] ---->
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Occupied fields : [ 6 , 15 ] [ 5 , 15 ][ 4 , 15 ][ 6 , 16 ] ---->
True
Occupied fields : [ 6 , 16 ] [ 7 , 16 ][ 8 , 16 ][ 6 , 17 ] ----->
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Occupied fields : [ 6 , 16 ] [ 5 , 16 ][ 4 , 16 ][ 6 , 17 ] ---->
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Occupied fields : [ 6 , 18 ] [ 5 , 18 ][ 4 , 18 ][ 6 , 19 ] ---->
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Occupied fields : [ 6 , 19 ] [ 7 , 19 ][ 8 , 19 ][ 6 , 18 ] ---->
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True
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Occupied fields : [
True
Occupied fields : [
True
Occupied fields : [ 7 . 2 ] [ 6 . 2 ] [ 5 . 2 ] [ 7 . 3 ]
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Occupied fields : [ 7 , 3 ] [ 8 , 3 ][ 9 , 3 ][ 7 , 4 ] ---->
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Occupied fields : [ 7 , 9 ] [ 6 , 9 ][ 5 , 9 ][ 7 , 10 ] ---->
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True
Occupied fields : [ 7 , 11 ] [ 6 , 11 ][ 5 , 11 ][ 7 , 12 ] ---->
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Occupied fields : [ 7 , 12 ] [ 8 , 12 ][ 9 , 12 ][ 7 , 13 ] ---->
True
```

```
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True
Occupied fields : [ 7 , 13 ] [ 8 , 13 ][ 9 , 13 ][ 7 , 14 ] ----->
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Occupied fields : [ 7 .
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Occupied fields : [ 7
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True
Occupied fields : [ 7 , 15 ] [ 8 , 15 ][ 9 , 15 ][ 7 , 16 ] ---->
True
Occupied fields : [ 7 , 15 ] [ 6 , 15 ][ 5 , 15 ][ 7 , 16 ] ---->
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Occupied fields : [ 7 , 16 ] [ 8 , 16 ][ 9 , 16 ][ 7 , 17
True
Occupied fields : [ 7 , 16 ] [ 6 , 16 ][ 5 , 16 ][ 7 , 17 ] ----->
True
Occupied fields : [ 7 , 17 ] [ 8 , 17 ][ 9 , 17 ][ 7 , 18 ] ---->
True
Occupied fields : [ 7 , 17 ] [ 6 , 17 ][ 5 , 17 ][ 7 , 18 ] ---->
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Occupied fields : [ 7 , 18 ] [ 8 , 18 ][ 9 , 18 ][ 7 , 19 ] ---->
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Occupied fields : [ 7 , 18 ] [ 6 , 18 ][ 5 , 18 ][ 7 , 19 ] ---->
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Occupied fields : [ 7 , 19 ] [ 8 , 19 ][ 9 , 19 ][ 7 , 18 ] ---->
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Occupied fields : [ 7 , 19 ] [ 6 , 19 ][ 5 , 19 ][ 7 , 18 ] ---->
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Occupied fields : [ 8 , 1 ] [ 9 , 1 ][ 10 , 1 ][ 8 , 2 ] ---->
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Occupied fields : [ 8 , 1 ] [ 7 , 1 ][ 6 , 1 ][ 8 , 2 ] ----->
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Occupied fields : [ 8 , 2 ] [ 9 , 2 ][ 10 , 2 ][ 8 , 3 ] ---->
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Occupied fields : [ 8 , 4 ] [ 7 , 4 ][ 6 , 4 ][ 8 , 5 ] ---->
True
```

```
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True
Occupied fields : [ 8 .
                      6 | [ 9 , 6 | [ 10 , 6 | [ 8 , 7 | ----->
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True
Occupied fields : [ 8
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True
Occupied fields : [ 8 , 8 ] [ 7 , 8 ][ 6 , 8 ][ 8 , 9 ]
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Occupied fields : [ 8 , 9 ] [ 9 , 9 ][ 10 , 9 ][ 8 , 10 ] ---->
True
Occupied fields : [ 8 , 9 ] [ 7 , 9 ][ 6 , 9 ][ 8 , 10 ] ---->
True
Occupied fields : [ 8 , 10 ] [ 9 , 10 ][ 10 , 10 ][ 8 , 11 ] -----
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Occupied fields : [ 8 , 10 ] [ 7 , 10 ][ 6 , 10 ][ 8 , 11 ] ---->
True
Occupied fields : [ 8 , 11 ] [ 9 , 11 ][ 10 , 11 ][ 8 , 12 ] -----
  True
Occupied fields : [ 8 , 11 ] [ 7 , 11 ][ 6 , 11 ][ 8 , 12 ] ---->
True
Occupied fields : [ 8 , 12 ] [ 9 , 12 ][ 10 , 12 ][ 8 , 13 ] -----
  True
Occupied fields : [ 8 , 12 ] [ 7 , 12 ][ 6 , 12 ][ 8 , 13 ] ---->
True
Occupied fields : [ 8 , 13 ] [ 9 , 13 ][ 10 , 13 ][ 8 , 14 ] -----
  True
Occupied fields : [ 8 , 13 ] [ 7 , 13 ][ 6 , 13 ][ 8 , 14 ] ---->
True
Occupied fields : [ 8 , 14 ] [ 9 , 14 ][ 10 , 14 ][ 8 , 15 ] -----
  True
Occupied fields : [ 8 , 14 ] [ 7 , 14 ][ 6 , 14 ][ 8 , 15 ] ---->
True
Occupied fields : [ 8 , 15 ] [ 9 , 15 ][ 10 , 15 ][ 8 , 16 ] -----
  True
Occupied fields : [ 8 , 15 ] [ 7 , 15 ][ 6 , 15 ][ 8 , 16 ] ---->
True
Occupied fields : [ 8 , 16 ] [ 9 , 16 ][ 10 , 16 ][ 8 , 17 ] -----
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Occupied fields : [ 8 , 16 ] [ 7 , 16 ][ 6 , 16 ][ 8 , 17 ] ---->
True
Occupied fields : [ 8 , 17 ] [ 9 , 17 ][ 10 , 17 ][ 8 , 18 ] -----
True
```

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Occupied fields : [ 8 , 17 ] [ 7 , 17 ][ 6 , 17 ][ 8 , 18 ] ---->
True
Occupied fields : [ 8 , 18 ] [ 9 , 18 ][ 10 , 18 ][ 8 , 19 ] -----
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Occupied fields : [ 8 .
                      18 | [ 7 , 18 | [ 6 , 18 | [ 8 , 19 ] ----->
True
Occupied fields : [ 8
                     . 19 | [ 9 . 19 | [ 10 . 19 | [ 8 . 18
  True
Occupied fields : [ 8
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Occupied fields : [ 9 , 0 ] [ 8 , 0 ][ 7 , 0 ][ 9 , 1 ] ---->
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Occupied fields : [ 9 , 1 ] [ 10 , 1 ] [ 11 , 1 ] [ 9 , 2 ] ---->
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Occupied fields : [ 9 , 1 ] [ 8 , 1 ][ 7 , 1 ][ 9 , 2 ] ---->
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Occupied fields : [ 9 , 2 ] [ 10 , 2 ][ 11 , 2 ][ 9 , 3 ] ---->
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Occupied fields : [ 9 , 2 ] [ 8 , 2 ][ 7 , 2 ][ 9 , 3 ] ---->
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Occupied fields : [ 9 , 3 ] [ 10 , 3 ][ 11 , 3 ][ 9 , 4 ] ---->
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True
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True
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Occupied fields : [ 9 , 8 ] [ 8 , 8 ][ 7 , 8 ][ 9 , 9 ] ---->
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Occupied fields : [ 9 , 9 ] [ 10 , 9 ][ 11 , 9 ][ 9 , 10 ] ---->
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Occupied fields : [ 9 , 9 ] [ 8 , 9 ][ 7 , 9 ][ 9 , 10 ] ---->
True
```

```
Occupied fields : [ 9 , 10 ] [ 10 , 10 ][ 11 , 10 ][ 9 , 11 ]
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Occupied fields : [ 9 , 10 ] [ 8 , 10 ][ 7 , 10 ][ 9 , 11 ] ---->
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Occupied fields : [ 9 , 14 ] [ 8 , 14 ][ 7 , 14 ][ 9 , 15 ] ---->
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Occupied fields : [ 9 , 15 ] [ 10 , 15 ][ 11 , 15 ][ 9 , 16 ]
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Occupied fields : [ 9 , 15 ] [ 8 , 15 ][ 7 , 15 ][ 9 , 16 ] ---->
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Occupied fields : [ 9 , 16 ] [ 10 , 16 ] [ 11 , 16 ] [ 9 , 17 ]
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Occupied fields : [ 9 , 16 ] [ 8 , 16 ][ 7 , 16 ][ 9 , 17 ] ---->
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Occupied fields : [ 9 , 17 ] [ 10 , 17 ][ 11 , 17 ][ 9 , 18 ]
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Occupied fields : [ 9 , 17 ] [ 8 , 17 ][ 7 , 17 ][ 9 , 18 ] ---->
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Occupied fields : [ 9 , 18 ] [ 10 , 18 ][ 11 , 18 ][ 9 , 19 ]
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Occupied fields : [ 9 , 19 ] [ 10 , 19 ] [ 11 , 19 ] [ 9 , 18 ]
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Occupied fields : [ 9 , 19 ] [ 8 , 19 ][ 7 , 19 ][ 9 , 18 ] ---->
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Occupied fields : [ 10 , 1 ] [ 9 , 1 ][ 8 , 1 ][ 10 , 2 ] ---->
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Occupied fields : [ 10 , 2 ] [ 11 , 2 ][ 12 , 2 ][ 10 , 3 ] ---->
True
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```
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Occupied fields : [ 10 , 4 ] [ 9 , 4 ][ 8 , 4 ][ 10 , 5 ] ---->
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Occupied fields : [ 10 , 5 ] [ 9 , 5 ][ 8 , 5 ][ 10 , 6 ] ---->
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Occupied fields : [ 10 , 7 ] [ 11 , 7 ][ 12 , 7 ][ 10 , 8 ] ---->
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Occupied fields : [ 10 , 7 ] [ 9 , 7 ][ 8 , 7 ][ 10 , 8 ] ---->
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Occupied fields : [ 10 , 8 ] [ 11 , 8 ][ 12 , 8 ][ 10 , 9 ] ---->
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Occupied fields : [ 10 , 8 ] [ 9 , 8 ][ 8 , 8 ][ 10 , 9 ] ---->
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Occupied fields : [ 10 , 9 ] [ 11 , 9 ][ 12 , 9 ][ 10 , 10 ] -----
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Occupied fields : [ 10 , 9 ] [ 9 , 9 ][ 8 , 9 ][ 10 , 10 ] ---->
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----> True
Occupied fields : [ 10 , 11 ] [ 11 , 11 ][ 12 , 11 ][ 10 , 12 ]
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Occupied fields : [ 10 , 14 ] [ 11 , 14 ][ 12 , 14 ][ 10 , 15 ]
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Occupied fields : [ 10 , 14 ] [ 9 , 14 ][ 8 , 14 ][ 10 , 15 ]
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```
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Occupied fields : [ 10 , 16 ] [ 9 , 16 ] [ 8 , 16 ] [ 10 , 17 ]
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Occupied fields : [ 10 , 17 ] [ 11 , 17 ][ 12 , 17 ][ 10 , 18 ]
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Occupied fields : [ 10 , 19 ] [ 9 , 19 ][ 8 , 19 ][ 10 , 18 ]
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Occupied fields : [ 11 , 6 ] [ 12 , 6 ][ 13 , 6 ][ 11 , 7 ] ----->
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Occupied fields : [ 11 , 6 ] [ 10 , 6 ][ 9 , 6 ][ 11 , 7 ] ---->
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True
```

```
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Occupied fields : [ 11 , 11 ] [ 12 , 11 ][ 13 , 11 ][ 11 , 12 ]
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Occupied fields : [ 11 , 11 ] [ 10 , 11 ][ 9 , 11 ][ 11 , 12 ]
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Occupied fields : [ 11 , 12 ] [ 12 , 12 ][ 13 , 12 ][ 11 , 13 ]
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Occupied fields : [ 11 , 12 ] [ 10 , 12 ][ 9 , 12 ][ 11 , 13 ]
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Occupied fields : [ 11 , 13 ] [ 10 , 13 ] [ 9 , 13 ] [ 11 , 14 ]
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Occupied fields : [ 11 , 14 ] [ 12 , 14 ][ 13 , 14 ][ 11 , 15 ]
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Occupied fields : [ 11 , 17 ] [ 10 , 17 ][ 9 , 17 ][ 11 , 18 ]
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Occupied fields : [ 11 , 18 ] [ 10 , 18 ][ 9 , 18 ][ 11 , 19 ]
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Occupied fields : [ 11 , 19 ] [ 12 , 19 ][ 13 , 19 ][ 11 , 18 ]
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Occupied fields : [ 11 , 19 ] [ 10 , 19 ][ 9 , 19 ][ 11 , 18 ]
----> True
```

```
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Occupied fields : [ 12 , 5 ] [ 11 , 5 ][ 10 , 5 ][ 12 , 6 ] ---->
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Occupied fields : [ 12 , 6 ] [ 11 , 6 ][ 10 , 6 ][ 12 , 7 ] ---->
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Occupied fields : [ 12 , 8 ] [ 11 , 8 ][ 10 , 8 ][ 12 , 9 ] ---->
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Occupied fields : [ 12 , 9 ] [ 13 , 9 ][ 14 , 9 ][ 12 , 10 ] -----
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Occupied fields : [ 12 , 9 ] [ 11 , 9 ][ 10 , 9 ][ 12 , 10 ] -----
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Occupied fields : [ 12 , 10 ] [ 13 , 10 ][ 14 , 10 ][ 12 , 11 ]
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Occupied fields : [ 12 , 10 ] [ 11 , 10 ][ 10 , 10 ][ 12 , 11 ]
----> True
Occupied fields : [ 12 , 11 ] [ 13 , 11 ][ 14 , 11 ][ 12 , 12 ]
----> True
Occupied fields : [ 12 , 11 ] [ 11 , 11 ][ 10 , 11 ][ 12 , 12 ]
----> True
Occupied fields : [ 12 , 12 ] [ 13 , 12 ][ 14 , 12 ][ 12 , 13 ]
----> True
```

Occupied fields : [12 , 12] [11 , 12][10 , 12][12 , 13]	
> True Occupied fields : [12 , 13] [13 , 13][14 , 13][12 , 14]	
> True	•
Occupied_fields : [12 , 13] [11 , 13][10 , 13][12 , 14]	
> True Occupied fields : [12 , 14] [13 , 14][14 , 14][12 , 15]	
> True	•
Occupied fields : [12 , 14] [11 , 14][10 , 14][12 , 15]	
> True Occupied fields : [12 , 15] [13 , 15][14 , 15][12 , 16]	
> True	•
Occupied fields : [12 , 15] [11 , 15][10 , 15][12 , 16]	
> True Occupied fields : [12 , 16] [13 , 16] [14 , 16] [12 , 17]	
> True	-
Occupied fields : [12 , 16] [11 , 16][10 , 16][12 , 17]	
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Occupied fields : [12 , 17] [11 , 17][10 , 17][12 , 18]	
Occupied fields : [12 , 18] [13 , 18][14 , 18][12 , 19]	
> True	
Occupied fields : [12 , 18] [11 , 18][10 , 18][12 , 19]	
Occupied fields : [12 , 19] [13 , 19][14 , 19][12 , 18]	
> True Occupied fields : [12 , 19] [11 , 19][10 , 19][12 , 18]	
> True	•
Occupied fields : [13 , 0] [14 , 0][15 , 0][13 , 1]	>
True Occupied fields : [13 , 0] [12 , 0][11 , 0][13 , 1]	>
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True Occupied fields : [13 , 1] [12 , 1][11 , 1][13 , 2]	>
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Occupied fields : [13 , 2] [14 , 2][15 , 2][13 , 3]	>
True Occupied fields : [13 , 2] [12 , 2][11 , 2][13 , 3]	>
True	
Occupied fields : [13 , 3] [14 , 3][15 , 3][13 , 4]	>
Occupied fields : [13 , 3] [12 , 3][11 , 3][13 , 4]	>
True	
Occupied fields : [13 , 4] [14 , 4][15 , 4][13 , 5] True	 >
Occupied fields : [13 , 4] [12 , 4][11 , 4][13 , 5]	>
True	

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Occupied fields : [ 13 , 17 ] [ 14 , 17 ][ 15 , 17 ][ 13 , 18 ]
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Occupied fields : [ 14 , 9 ] [ 15 , 9 ][ 16 , 9 ][ 14 , 10 ] -----
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Occupied fields : [ 14 , 9 ] [ 13 , 9 ][ 12 , 9 ][ 14 , 10 ] -----
True
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True
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Occupied fields : [ 15 , 14 ] [ 14 , 14 ][ 13 , 14 ][ 15 , 15 ]
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True
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True
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----> True
Occupied fields : [
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Occupied fields : [ 19
                                     19
----> True
Check loose cases..
Occupied fields : [ 0
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Occupied fields :
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Occupied fields :
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Occupied fields
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Occupied fields
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Occupied fields :
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Occupied fields :
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Occupied fields :
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                        11 1
Occupied fields
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Occupied fields : [ 0 , 12 ] [ 1 , 12 ] [ 0 , 13 ]
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Occupied fields:
                        13 1
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                                             18 1
Occupied fields :
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Occupied fields :
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                        19 1
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Occupied fields :	[1	10	0]	, 10][1	, 11]> False
Occupied fields :	[1	, 11	[2	, 11][1	, 12]> False
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Occupied fields :	11 ,	15]	[10	. 15	1 [11	, 16 , 16]>	False
Occupied fields :	11, 11,	16]	[12	. 16	1 11	. 17]>	False
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Occupied fields :	11, 11,	17]	[10	. 17	1 [11	, 18]>	False
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Occupied fields :	11 ,	18]	[10	, 18	1 [11	, 19]>	False
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Occupied fields : [15 ,	19]	[14	, 19]	[15	, 18	>	False
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Occupied fields : [16 ,	. 1] [15 ,	1][16 , :	2]	> Fal	se
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Occupied fields : [16,	4] [17,	4] [16 , !	5]	> Fal	se
Occupied fields : [16,	4] [15,	4] [16 ,	5]	> Fal	se
Occupied fields : [16,	5] [17,	5] [16 ,	6]	> Fal	se
Occupied fields : [16,	5] [15 ,	5] [16 ,	6]	> Fal	se
Occupied fields : [16,	6][17,	6] [16 ,	7]	> Fal	se
Occupied fields : [16,	6][15 ,	6] [16 ,	7]-:	> Fal	se
Occupied fields : [16,	7] [17,	7] [16 , 8	8]	> Fal	se
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Occupied fields : [16 ,		15 ,				> Fal	
Occupied fields : [16 ,	9][17 ,	9] [10] ·		lse
Occupied fields : [16 ,		15 ,	9] [lse
Occupied fields : [16 ,				[16	<u> </u>		False
Occupied fields : [16 ,	10]	[15		[16	, 11	>	False
Occupied fields : [16 ,		[17	, – – 🔒		, 12	>	False
Occupied fields : [16 ,			, 11]		, 12	>	False
Occupied fields : [16 ,	12]	[17	, 12]	[16	, 13	>	False
Occupied fields : [16 ,		[15	, 12]	[16	, 13	>	False
Occupied fields : [16 ,		[17	, 13]		, 14		False
Occupied fields : [16,	13]	[15	, 13]	[16	, 14	>	False
Occupied fields : [16,		[17	,	[16	, 15	>	False
Occupied fields : [16 ,			, 14]		, 15	>	False
Occupied fields : [16 ,	15]	[17	, 15]	[16	, 16	>	False

Ossumind fields :	г 1С	1 - 1	г 1г	1г	1 [1]	1.0	1 .	Falsa
Occupied fields:	[16 ,	15]	[15	, 15][16	, 16]>	False
Occupied fields :	[16 ,		[17	, 16		, 17		False
Occupied fields:	[16 ,	16]	[15	, 16][16	, 17]>	False
Occupied fields :	[16 ,	17]	[17	, 17][16	, 18]>	False
Occupied fields :	[16 ,		[15	, 17][16	, 18		False
Occupied fields :	[16 ,	18]	[17	, 18][16	, 19]>	False
Occupied fields :	[16 ,	18]	[15	, 18][16	, 19]>	False
Occupied fields :	[16 ,		[17	, 19		, 18		False
Occupied fields :	[16 ,	19]	[15	, 19][16	, 18]>	False
Occupied fields :	[17 ,	0]	[18 ,	0] [17 ,			lse
Occupied fields :	[17 ,	0]	[16 ,	0][17 ,	1] -		lse
Occupied fields :	[17 ,	1]	[18 ,	1][17 ,	2]-		lse
Occupied fields :	[17 ,	1]	[16 ,	1][17 ,	2] -	> Fa	lse
Occupied fields :	[17 ,	2]	[18 ,	2] [17 ,	3] -	> Fa	lse
Occupied fields :	[17 ,	2]	[16 ,	2] [17 ,	3] -		lse
Occupied fields :	[17 ,	3]	[18 ,	3] [17 ,	4] -	> Fa	lse
Occupied fields :	[17 ,	3]	[16 ,	3] [17 ,	4] -	> Fa	lse
Occupied fields :	[17 ,	4]	[18 ,	4] [17 ,	5] -		lse
Occupied fields :	[17 ,	4]	[16 ,	4] [17 ,	5] -	> Fa	lse
Occupied fields :	[17 ,	5]	[18 ,	5] [17 ,	6]-	> Fa	lse
Occupied fields :	[17 ,	5]	[16 ,	5] [17 ,	6] -	> Fa	lse
Occupied fields :	[17 ,	6]	[18 ,	6] [17 ,	7] -	> Fa	lse
Occupied fields :	[17 ,	6]	[16 ,	6] [17 ,	7]-	> Fa	lse
Occupied fields :	[17 ,	7]	[18 ,	7] [17 ,	8] -	> Fa	lse
Occupied fields :	[17 ,	7]	[16 ,	7][17 ,	8] -	> Fa	lse
Occupied fields :	Ī 17 .	8 1	[18 ,	8 1 [17 .	9 1 -	> Fa	lse
occupica iletas .	L - ' ,		L - ,		<u> </u>			L 3 C
Occupied fields :	[17 ,	8]	[16 ,	8][17 ,	9] -		lse
Occupied fields :	- ′						> Fa	
Occupied fields : Occupied fields :	[17 ,	8]	[16 ,	8] [17 ,	9] -	> Fa > F	lse
Occupied fields : Occupied fields :	[17 , [17 ,	8]	[16 , [18 ,	8] [9] [17 , 17 ,	9 j <i>-</i>	> Fa > F	lse alse
Occupied fields : Occupied fields : Occupied fields : Occupied fields :	[17 , [17 , [17 ,	8] 9] 9]	[16 , [18 , [16 ,][8][9][9	17 , 17 ,	9] - 10] 10]	> Fa > F > F	lse alse alse
Occupied fields: Occupied fields: Occupied fields: Occupied fields: Occupied fields:	[17 , [17 , [17 , [17 ,	8] 9] 9] 10]	[16 , [18 , [16 , [18	8] [9] [9] [, 10 , 10	17 , 17 , 17 ,] [17] [17	9] - 10] 10] , 11	> Fa > F > F]>]>	lse alse alse False False
Occupied fields: Occupied fields: Occupied fields: Occupied fields: Occupied fields: Occupied fields:	[17 , [17 , [17 , [17 , [17 ,	8] 9] 9] 10]	[16 , [18 , [16 , [18 [16 [18	8][9][9][, 10 , 10 , 11	17 , 17 ,	9] - 10] 10] , 11	> Fa > F > F]>]>	lse alse alse False False False
Occupied fields:	[17 , [17 , [17 , [17 , [17 , [17 ,	8] 9] 9] 10] 10] 11]	[16 , [18 , [16 , [18] [16] [18]	8][9][9][, 10 , 10 , 11	17 , 17 , 17 ,] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12	> Fa > F > F]>]>	lse alse alse False False False
Occupied fields:	[17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [8] 9] 10] 10] 11] 11]	[16 , [18 , [16 , [18] [16] [18]	8][9][9][, 10 , 10 , 11 , 11	17 , 17 , 17 ,] [17] [17] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12	> Fa > F > F]>]>]>	lse alse alse False False False False
Occupied fields:	[17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [8] 9] 9] 10] 10] 11] 11] 12]	[16 , [18 , [16 , [18] [16] [18] [16]	8] [9] [9] [, 10 , 11 , 11 , 12 , 12	17 , 17 , 17 ,] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13	> Fa > F > F]>]>]>	lse alse alse False False False False False False
Occupied fields:	[17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [17 , [8] 9] 9] 10] 11] 11] 12] 12] 13]	[16 , [18 , [16 , [18] [16] [18] [16] [18] [16]	8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13	17 , 17 , 17 ,] [17] [17] [17] [17] [17] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14	> Fa > F > F]>]>]>]>	lse alse False False False False False False False False
Occupied fields:	[17 , [17 , [17 ,]]] [17 ,] [1	8] 9] 10] 10] 11] 11] 12] 12] 13]	[16 , [18 , [16 , [18] [16] [18] [16] [18] [16]	8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13 , 13	17 , 17 , 17 ,] [17] [17] [17] [17] [17] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14 , 14	> Fa > F > F]>]>]>]>	lse alse alse False False False False False False False False
Occupied fields:	[17 , [8] 9] 9] 10] 11] 11] 12] 12] 13] 13]	[16 , [18 , [16 , [18] [16] [18] [16] [18] [16] [18]	8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13 , 13 , 14	17 , 17 , 17 ,] [17] [17] [17] [17] [17] [17] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 14 , 14 , 15	> Fa> F> F]>]>]>]>]>]>	lse alse alse False False False False False False False False False
Occupied fields:	[17 , [8] 9] 9] 10] 11] 11] 12] 12] 13] 13] 14]	[16 , [18 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13 , 14 , 14	17 , 17 , 17 ,] [17] [17] [17] [17] [17] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14 , 14	> Fa> F> F]>]>]>]>]>]>]>	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 11] 11] 12] 12] 13] 13] 14] 14] 15]	[16 , [18 , [16 , [18] [16] [18]	8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13 , 14 , 14 , 14	17 , 17 , 17 ,] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 14 , 14 , 15 , 15 , 16	> Fa> F> F]>]>]>]>]>]>]>]>	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 11] 11] 12] 13] 13] 14] 14] 15]	[16 , [18 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13 , 14 , 14 , 15 , 15	17 , 17 , 17 , 17 ,] [17]] [17]] [17]] [17]] [17]] [17]] [17]] [17]] [17]] [17]] [17]	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 15 , 16 , 16	> Fa> F> F]>]>]>]>]>]>]>]>	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 10] 11] 12] 12] 13] 14] 14] 15] 15]	[16 , [18 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 10 , 11 , 12 , 12 , 13 , 14 , 15 , 15 , 16	17 , 17 , 17 ,] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 16 , 16 , 17	> Fa> F> F]>]>]>]>]>]>]>]>]>]>	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 11] 11] 12] 13] 13] 14] 15] 15] 16]	[16 , [18 , [18 , [8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13 , 14 , 14 , 15 , 15 , 16 , 16	17 , 17 , 17 ,] [17]] [17	9] - 10] 10] , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 16 , 16 , 17 , 17	> Fa> F> F > > > > > > > > > > > > >	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 11] 11] 12] 13] 13] 14] 15] 15] 16] 16] 17]	[16 , [18 , [18 , [8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13 , 14 , 14 , 15 , 16 , 16 , 17	17 , 17 , 17 , 17 ,] [17]]	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 15 , 16 , 16 , 17 , 17 , 18	> Fa> F> F > > > > > > > > > > > > > > > >	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 10] 11] 12] 12] 13] 14] 14] 15] 16] 16] 17]	[16 , [18 , [18 , [16 , [18 , [16 , [18 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 11 , 11 , 12 , 12 , 13 , 14 , 15 , 16 , 16 , 16 , 17	17 , 17 , 17 ,] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 16 , 16 , 17 , 17 , 18 , 18	> Fa> F> F > > > > > > > > > > > > > > > >	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 10] 11] 12] 12] 13] 14] 15] 16] 16] 17] 17] 18]	[16 , [18 , [18 , [16 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 10 , 11 , 12 , 12 , 13 , 14 , 14 , 15 , 15 , 16 , 17 , 17 , 18	17 , 17 , 17 ,] [17]] [17	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 15 , 16 , 16 , 17 , 17 , 18 , 18 , 19	> Fa> F> F > F > > > > > > > > > > > > > > >	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 11] 11] 12] 13] 13] 14] 15] 16] 16] 17] 17] 18]	[16 , [18 , [18 , [16 , [18 , [18 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 10 , 11 , 12 , 12 , 13 , 14 , 15 , 15 , 16 , 16 , 17 , 17 , 18 , 18	17 , 17 , 17 , 17 ,] [17]]	9] - 10] 10] , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 15 , 16 , 17 , 17 , 18 , 18 , 19 , 19	> Fa> F> F > F > > > > > > > > > > > > > > >	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 11] 12] 12] 13] 14] 15] 16] 16] 17] 18] 18]	[16 , [18 , [18 , [16 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 10 , 11 , 12 , 12 , 13 , 14 , 15 , 15 , 16 , 16 , 17 , 17 , 18 , 18 , 19	17 , 17 , 17 , 17 ,] [17]]	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 14 , 14 , 15 , 16 , 16 , 17 , 17 , 18 , 18 , 19 , 19 , 18	> Fa> F> F > F > > > > > > > > > > > > > > > > > >	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 10] 11] 12] 12] 13] 14] 15] 16] 16] 17] 18] 18] 19]	[16 , [18 , [18 , [16 , [18 , [18 , [16 , [18 , [18 , [18 , [18 , [18 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 10 , 11 , 12 , 12 , 13 , 14 , 14 , 15 , 15 , 16 , 17 , 17 , 18 , 18 , 19 , 19	17 , 17 , 17 , 17 ,] [17]]	9] - 10] 10] , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 15 , 16 , 17 , 17 , 18 , 18 , 19 , 19 , 18 , 18	> Fa> F> F > F > > > > > > > > > > > > > > > > > >	lse alse alse False
Occupied fields:	[17 , [8] 9] 9] 10] 10] 11] 12] 12] 13] 14] 15] 16] 16] 17] 18] 18] 19]	[16 , [18 , [18 , [16 , [18 , [16 , [18 , [8] [9] [9] [, 10 , 10 , 11 , 12 , 12 , 13 , 14 , 14 , 15 , 15 , 16 , 17 , 17 , 18 , 18 , 19 , 19	17 , 17 , 17 , 17 ,] [17]]	9] - 10] 10] , 11 , 11 , 12 , 12 , 13 , 13 , 14 , 14 , 15 , 15 , 16 , 17 , 17 , 17 , 18 , 18 , 19 , 19 , 18 , 18	> Fa> F> F > F > > > > > > > > > > > > > > > > >	lse alse alse False

	- 10 1			4.0	_		
Occupied fields :	[18 , 1] [19	, 1][18 , 2			False
Occupied fields :	[18 , 1] [17	, 1][18 , 2]		False
Occupied fields :	[18 , 2] [19	, 2][18 , 3			False
Occupied fields :	[18 , 2] [17	, 2 1 [18 , 3			False
Occupied fields :	18 , 3] [19	. 3 1 [18 , 4	i		False
Occupied fields :	[18 , 3	1 1 17	3 1 [18 , 4			False
Occupied fields :	[18 , 4		, <u>3] [</u> , 4] [18 , 5	i		False
Occupied fields :	[18 , 4] [17	, <u>-][</u> , 4][18 , 5			False
· · · · · · · · · · · · · · · · · · ·							
Occupied fields:	[18 , 5] [19	, 5][18 , 6			False
Occupied fields:	[18 , 5] [17	, 5][18 , 6			False
Occupied fields :	[18 , 6		, 6][18 , 7			False
Occupied fields :	[18 , 6] [17	, 6][18 , 7]		False
Occupied fields :	[18 , 7] [19	, 7][18 , 8			False
Occupied fields :	[18 , 7] [17	, 7][18 , 8			False
Occupied fields :	[18 , 8] [19	, 8][18, 9			False
Occupied fields :	[18 , 8] [17	, 8][18 , 9]		False
Occupied fields :	18,9	1 [19	, 9] [18 , 1	o ⁻] ·		False
Occupied fields :	[18 , 9	1 17	. 9 1 [18 , 1			False
Occupied fields :	[18 , 1		. 10	18 ,	11		
Occupied fields :	[18 , 1		. 10	[18 ,		' 	
Occupied fields :	[18 , 1		. 11	[18 ,	12	 	
Occupied fields :	[18 , 1		. 11 1		12		
the state of the s			· '				
Occupied fields:	[18 , 1		, 12]	[18 ,			. 5. 2 5 5
Occupied fields :	[18 , 1		, 12]	[18 ,	13		
Occupied fields :	[18 , 1		, 13]	[18 ,	14		
Occupied fields :	[18 , 1		, 13]	[18 ,	14		. 5. 2 5 5
Occupied fields :	[18 , 1		, 14]	[18 ,	15		
Occupied fields :	[18 , 1	4] [17	, 14]	[18 ,	15		> False
Occupied fields :	[18 , 1	5] [19	, 15]	[18 ,	16		> False
Occupied fields :	[18 , 1	5] [17	, 15]	[18 ,	16		> False
Occupied fields :	[18 , 1	6] [19	, 16]	[18 ,	17		> False
Occupied fields :	[18 , 1	6] [17	. 16	[18 ,	17		> False
Occupied fields :	[18 , 1		, <u></u>	18,	18		
Occupied fields :	[18 , 1		, 17	18 ,	18		
Occupied fields :	[18 , 1		, 18	F 10	10	 	
Occupied fields :	[18 , 1		, 18]	[18 <u>,</u> [18 ,	19		
	-		, 18] , 19]	-		•	
Occupied fields:	[18 , 1		•	[18 ,	18		
Occupied fields:	[18 , 1			10 18 ,	18		
Occupied fields :	[19 , 0] [18	, 0][19 , 1		>	False
Occupied fields :	[19 , 1		, 1][19 , 2			False
Occupied fields :			, 2] [False
Occupied fields :	[19 , 3] [18	, 3][19 , 4			False
Occupied fields :	[19 , 4] [18	, 4] [19 , 5			False
Occupied fields :	[19 , 5] [18	, 5][19 , 6			False
Occupied fields :	[19 , 6] [18	, 6] [19 , 7			False
Occupied fields :	[19 , 7	1 5 10	, 7][19 , 8]		False
Occupied fields :			, 8][False
Occupied fields :	[19 , 9		, <u>, , , , , , , , , , , , , , , , , , </u>	19 , 1			False
Occupied fields :	[19 , 1			[19 ,			
Occupied fields :	[19 , 1		44	[19 ,	45		
Occupied fields :	[19 , 1		,11 <u>]</u> .12]	[19 , [19 .	13		
occupieu i retus":	[I J , I	_	, ₁ 2]	L 13 ,	13		> False

Occupied	fields	:	Τ	19	,	13]	[18	,	13][19	,	14]	>	False
Occupied	fields			19		14			18		14		19		15			False
Occupied	fields			19		15			18		15		19		16			False
Occupied	fields			19		16			18		16		19		17			False
Occupied	fields			19		17			18		17		19		18			False
Occupied	fields			19		18			18		18		19		19			False
Occupied	fields			19		19			18		19		19		18			False

——> Aus dem Test kann man entnehmen, dass die verschiedenen Belegungen richtig interpretiert werden, wodurch für den folgenden Test die richtige Funktionsweise von __check_for_win_of vorausgesetzt werden kann.

Test der Methode "is_game_finish"

Diese Methode ruft die Methode __check_for_win_of aus, wessen korrekte Funktionsweise bereits durch den vorherigen Test bewiesen wurde.

Die Method dient zur Abfrage, ob das Spiel beendet wurde. Als Rückgabewert wird die 0 für kein Spieler hat gewonnen, die 1 für Spieler 1 hat gewonnen und die 2 für Spieler 2 hat gewonnen genutzt.

Bei diesem Test wir der Glass-Box-Test verwendet. Es wird also versucht, alle möglichen Verzweigungen aufzurufen.

Dadurch ergeben sich drei verschiedene Testfälle:

- -An die Methode wird eine Spielfeld übergeben, in welchem kein Spieler ein Sieg erzielt. Der erwartete Rückgabewert ist die 0
- -An die Methode wird ein Spielfeld übergeben, in welchem Spieler 1 ein Sieg erzielt. Der erwartete Rückgabewert ist die 1
- -An die Methode wird ein Spielfeld übergeben, in welchem Spieler 2 ein Sieg erzielt. Der erwartete Rückgabewert ist die 2

Ergebnis des Tests:

```
Checking functionality of is_game_finish.....

No one has won the game ---> 1

Player one has won the game ---> 2
```

Aus dem Test kann man schlussfolgern, dass die Methode funktioniert, wodurch der Test des Modul beendet ist.