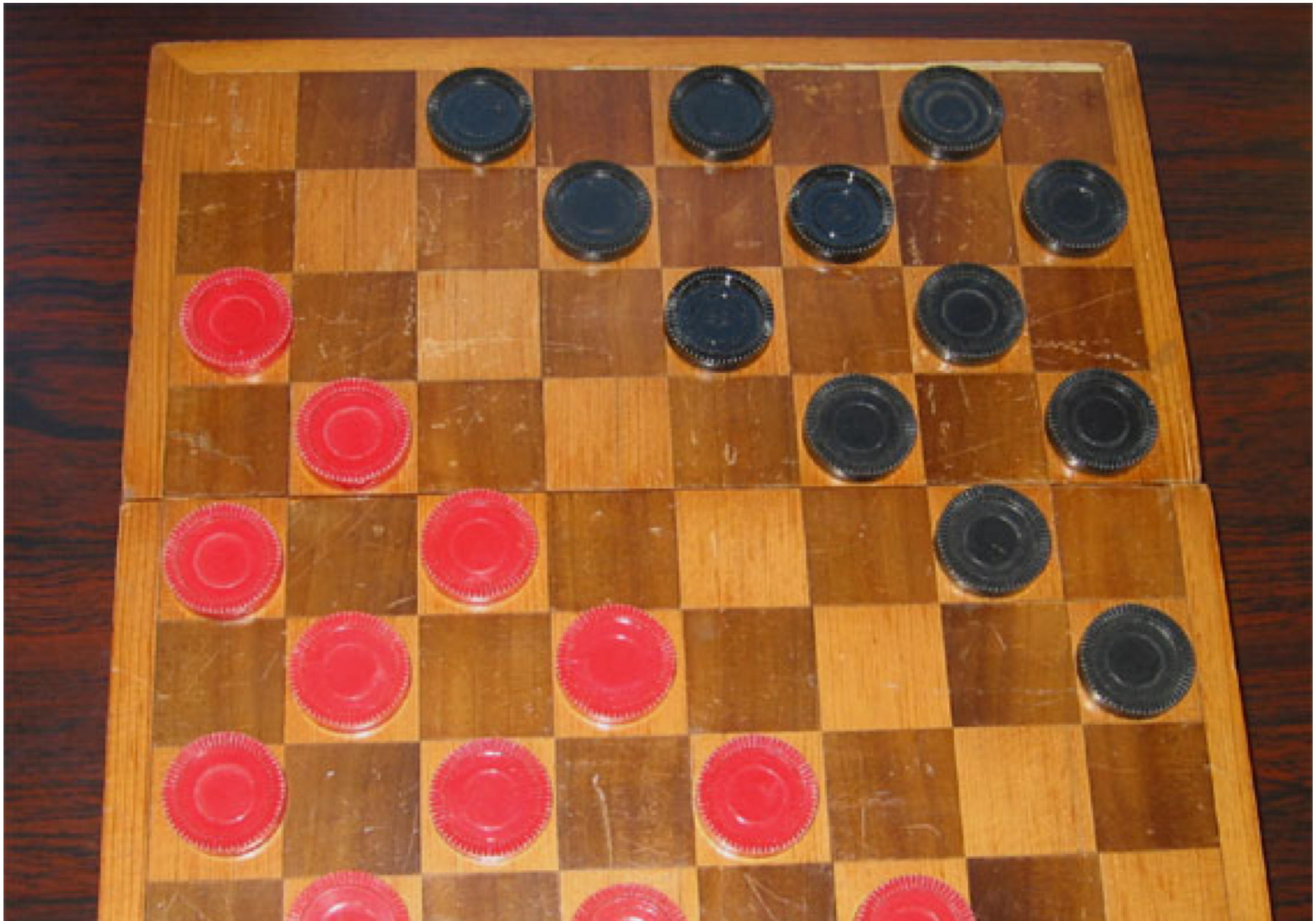
2-D Lists



androidboom.com

All of these games use a **grid** to store information.

- In Python, we can represent information like this using a **two-dimensional list.**
  - Sometimes called a **nested list**.
- A 2d list is a list that contains other lists as elements.
  - Remember, Python lists can contain any data type: ints, strings, floats, and now other lists.
- Whenever your program needs (conceptually) a grid or matrix, and all of the items in the structure have the same data type, you probably want a 2d list.

- demo

```
grid = [[1, 3, 5, 7], [2, 4, 6, 8], [5, 10, 15, 20]]
```

Visualize lists-within-lists as a two-dimensional structure.

	column 0	column 1	column 2	column 3
row 0	1	3	5	7
row 1	2	4	6	8
row 2	5	10	15	20

grid = [[1, 3, 5, 7], [2, 4, 6, 8], [5, 10, 15, 20]]

Access individual elements by using double square brackets: row, then column → [row][col]

	column 0	column 1	column 2	column 3
row 0	1	3	5	7
row 1	2	4	6	8
row 2	5	10	15	20

grid = [[1, 3, 5, 7], [2, 4, 6, 8], [5, 10, 15, 20]]

Access individual elements by using double square brackets: row, then column → [row][col]

	column 0	column 1	column 2	column 3
row 0	1 grid[0][0]	3 grid[0][1]	5 grid[0][2]	7 grid[0][3]
row 1	2 grid[1][0]	4 grid[1][1]	6 grid[1][2]	8 grid[1][3]
row 2	5 grid[2][0]	10 grid[2][1]	15 grid[2][2]	20 grid[2][3]

```
grid = [["cat", "dog", "fish"], ["horse", "pig", "ox"]]

What is grid[0][0] ?
What is grid[1][2] ?
What is grid[2][1] ?
What is grid[1][3] ?
What is grid[1][0] ?
grid[1][0] = "pony"
What is grid[1][0] ?
What is grid[1]?
```

How can we calculate the number of **rows** in a 2-d list?

```
matrix = [[1, 2, 3], [4, 5, 6]]
```

How do we figure out how many rows matrix has?

```
len(matrix) → 2
```

How can we calculate the number of **columns** in a 2-d list?

```
matrix = [[1, 2, 3], [4, 5, 6]]
```

How do we figure out how many columns matrix has?

```
len(matrix[0]) → 3
```

(could replace the [0] part with any valid index)

For loops over 2-d lists

To print the entire 2d list:

```
grid = some arbitrary 2d list

for row in range(0, ???):
  for col in range(0, ???):
    print(grid[row][col])
```

For loops over 2-d lists

To print the entire 2d list:

```
grid = some arbitrary 2d list

for row in range(0, len(grid)):
  for col in range(0, len(grid[0])):
    print(grid[row][col])
```

For loops over 2-d lists

To print a single row (say, row `i`)

```
grid = some arbitrary 2d list
i = some valid row number for grid

for col in range(0, ???):
  print(grid[???][???])
```

For loops over 2-d lists

To print a single row (say, row `i`)

```
grid = some arbitrary 2d list
i = some valid row number for grid

for col in range(0, len(grid[0])):
  print(grid[i][col])
```

For loops over 2-d lists

To print a single column (say, col j)

```
grid = some arbitrary 2d list
j = some valid column number for grid

for row in range(0, ???):
  print(grid[???][???])
```

For loops over 2-d lists

To print a single column (say, col `j`)

```
grid = some arbitrary 2d list
j = some valid column number for grid

for row in range(0, len(grid)):
  print(grid[row][j])
```

LAB TIME! YAY!