CS112 : Introduction to Python Programming

Week 9: lab practice

Practice 1

- Create a 10 x 10 arrays of zeros and then "frame" it with a border of ones:

```
The final matrix is
 [[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]]
```

Practice 2

- The following two arrays `y`, and `t` are respectively the position vs. time of a falling object, say a ball. Please calculate the average velocity as a function of time:

```
y = np.array([0., 1.3, 5. , 10.9, 18.9, 28.7, 40.])
t = np.array([0., 0.49, 1. , 1.5 , 2.08, 2.55, 3.2])
```

Practice 3

- Create an 8x8 matrix and fill it with a checkerboard pattern.

- Expected output:

```
[[0 1 0 1 0 1 0 1]
 [1 0 1 0 1 0 1 0]
 [0 1 0 1 0 1 0 1]
 [1 0 1 0 1 0 1 0]
 [0 1 0 1 0 1 0 1]
 [1 0 1 0 1 0 1 0]
 [0 1 0 1 0 1 0 1]
 [1 0 1 0 1 0 1 0]]
```