



CS217: Computer Programming Language: Numpy lab

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Exercise 1

- Suppose PM2.5 records for 25 days are as follow.
- $Pm25 = [71, 98, 80, 85, 85, 93, 74, 70, 88, 80, 91, 83, 82, 84, 84, 84, 84, 82, 80, 88, 79, 95, 87, 85, 90]$
- Create a numpy array representing the data and print its length.

Exercise 2

- Using the PM2.5 data, write a program to calculate
 - Average PM2.5 over 25 days
 - Maximum and minimum PM2.5 values
 - The days that max and min happened



Exercise 3

- Using PM2.5 data, write a program to count the number of days where PM2.5 reading is above the average.

Exercise 4

- A magic square is a matrix where these sums are equal
 - Sum along the each row
 - Sum along the each column
 - Sum along left-right diagonal
 - Sum along right-left diagonal
- Write a function that takes a square matrix and return True if the matrix is magic square, else return False.

Code tester

- Using your function to check

```
A=np.array([[17, 24, 1, 8, 15],[23, 5, 7, 14, 16],[ 4, 6, 13, 20, 22],[10, 12, 19, 21, 3],[11, 18, 25, 2, 9]])
```



Exercise 5

- Average PM2.5 for January, February, March and May are 151, 180, 310 and 192
- Unfortunately PM2.5 for April is missing
- Write a program that interpolate these data and infer PM2.5 data for April

Hint

```
import numpy as np
from scipy import interpolate

month = [1,2,3,5]
pm25 = [151,180,310,192]

f = interpolate.interp1d(month, pm25)
april = np.array([4])
interfered_pm25 = f(april) # use interpolation function returned by `interp1d`
print(interfered_pm25)
```