Artificial Intelligence with Python

Lab Report 02: Numpy, Matplotlib and Dictionaries

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Define a dictionary that contains "names" as keys and "CGPA" as values and write a Python program to iterate over the defined dictionary using for loops.

In [1]:

```python
dictionary = {'Sarwar':2.8,'Fatima':3.5,'Sadia':3.9,'Deepak':3.3,'Hammad':3.7}
i = 0
for i in dictionary.items():
    item = i
    print(item)
```

```
('Sarwar', 2.8)
('Fatima', 3.5)
('Sadia', 3.9)
('Deepak', 3.3)
('Hammad', 3.7)
```

Write a Python program to find the average CGPA of your class in a dictionary

In [2]:

```python
dictionary = {'Sarwar':2.8,'Fatima':3.5,'Sadia':3.9,'Deepak':3.3,'Hammad':3.7}
values = 0
for i in dictionary.values():
    values += i
length = len(dictionary)
average = values/length
print("Average CGPA of the class =",average)
```

```
Average CGPA of the class = 3.44
```

Write a Python program to sort the defined dictionary by key

In [3]:

```python
dictionary = {'Sarwar':2.8,'Fatima':3.5,'Sadia':3.9,'Deepak':3.3,'Hammad':3.7}
keys = dictionary.keys()
sorted(keys)
```

Out[3]:

```
['Deepak', 'Fatima', 'Hammad', 'Sadia', 'Sarwar']
```

Write a python program to plot bar chart of the dictionary in a way that x-axis should display names of your friends and y-axis should be for CGPA. (Hint Explore ticks in matplotlib to put names on x-axis).
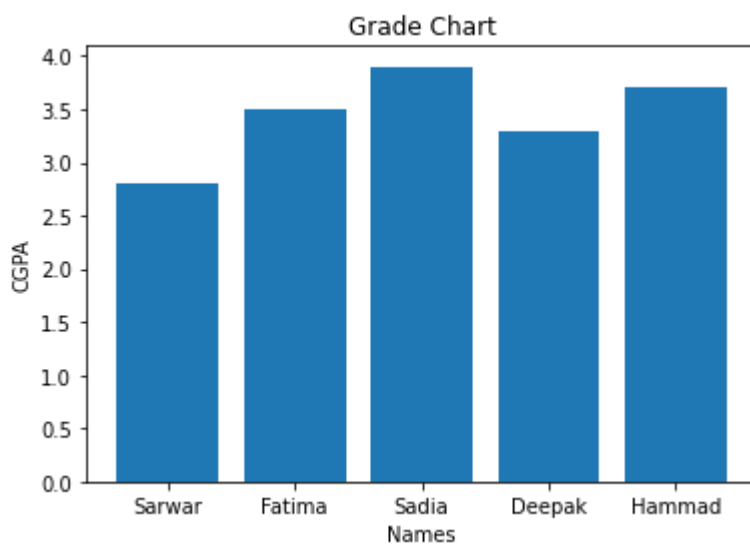
In [4]:

```python
import matplotlib.pyplot as plt
dictionary = {'Sarwar':2.8,'Fatima':3.5,'Sadia':3.9,'Deepak':3.3,'Hammad':3.7}
x = dictionary.keys()
y = []
y = dictionary.values()

plt.xlabel("Names")
plt.ylabel("CGPA")
plt.title("Grade Chart")

plt.bar(x,y)
```

Out[4]:

```
<BarContainer object of 5 artists>
```


Define a 2D NumPy array of shape (8, 8), multiply with last digit of your CMS-ID and access value at 5th row and 5th column.

In [5]:

```python
import numpy as np
arr = np.arange(64)
x = arr.reshape(8,8)
y = x*7
y,("5th row and 5th column value =",y[5,5])
```

Out[5]:

```
(array([[  0,   7,  14,  21,  28,  35,  42,  49],
        [ 56,  63,  70,  77,  84,  91,  98, 105],
        [112, 119, 126, 133, 140, 147, 154, 161],
        [168, 175, 182, 189, 196, 203, 210, 217],
        [224, 231, 238, 245, 252, 259, 266, 273],
        [280, 287, 294, 301, 308, 315, 322, 329],
        [336, 343, 350, 357, 364, 371, 378, 385],
        [392, 399, 406, 413, 420, 427, 434, 441]]),
 ('5th row and 5th column value =', 315))
```

Define a 3D NumPy array of shape (5, 4, 4), multiply with digit of your CMS-ID and access its first two elements of 3rd row in 3rd Matrix.

In [6]:

```python
import numpy as np
arr = np.arange(80)
x = arr.reshape(5,4,4)
y = x*7
y,"First two elements in 3rd row in 3rd matrix is =",y[3,3,(0,1)]
```

Out[6]:

```
(array([[[  0,    7,   14,   21],
         [ 28,   35,   42,   49],
         [ 56,   63,   70,   77],
         [ 84,   91,   98,  105]],

        [[112,  119,  126,  133],
         [140,  147,  154,  161],
         [168,  175,  182,  189],
         [196,  203,  210,  217]],

        [[224,  231,  238,  245],
         [252,  259,  266,  273],
         [280,  287,  294,  301],
         [308,  315,  322,  329]],

        [[336,  343,  350,  357],
         [364,  371,  378,  385],
         [392,  399,  406,  413],
         [420,  427,  434,  441]],

        [[448,  455,  462,  469],
         [476,  483,  490,  497],
         [504,  511,  518,  525],
         [532,  539,  546,  553]]]),
 'First two elements in 3rd row in 3rd matrix is =',
 array([420, 427]))
```