# TSC - Numpy

Problem Discussion with Sabyasachi

# 1. Meshgrid - Broadcasting

Implement np.meshgrid

X = np.arange(5)

Y = np.array(6,11)

print(np.meshgrid(X,Y))

```
[array([[0, 1, 2, 3, 4],
       [0, 1, 2, 3, 4],
       [0, 1, 2, 3, 4],
       [0, 1, 2, 3, 4],
       [0, 1, 2, 3, 4]]), array([[ 6,  6,  6,  6,  6],
       [ 7,  7,  7,  7,  7],
       [ 8,  8,  8,  8,  8],
       [ 9,  9,  9,  9,  9],
       [10, 10, 10, 10, 10]])]
```

# 1. Meshgrid - Solution

```
1  import numpy as np
2
3  X = np.arange(5)
4  Y = np.arange(6,11)
5  print(np.meshgrid(X,Y))
6
7  X1 = X + np.zeros(5).reshape(5,1)
8  Y1 = Y.reshape(5,1) + np.zeros(5)
9  print(X1,Y1)
```

# 2. Distances - Broadcasting

**Standard Question**

You are given a set of let’s say five 2d points as an ndarray and you want to compute the euclidean distance between each pair of points and store it into a 5*5 ndarray.

Source: One of the TODOs of the Lab Question 3

# 2. Distances - Solution

```
def distance(arr):
    diff = arr.reshape(arr.shape[0], 1, arr.shape[1]) - arr
    dist = np.sqrt(np.sum(diff**2, axis=2))
    return dist
```

# 3. Labels to Centers

One of the TODOs of the Lab Question 3

Given labels of spicepoints, what are the updated centers

# 3. Labels to Centers – Solution

```
labels_one_hot = np.zeros((len(data), K))
labels_one_hot[np.arange(len(data)), labels] = 1
centers = np.dot(labels_one_hot.T, data)/np.sum(labels_one_hot,
    axis=0).reshape(K,1)
```