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In [1]:

```
import numpy as np
from scipy import linalg as LA
```

In [2]:

```
def findspectral(a):
    zx = []
    dim = len(a)
    e_vals, z = LA.eig(a)
    zi = np.linalg.inv(z)
    anx = np.zeros((dim, dim))
    for i in range(0, dim):
        ik = np.zeros((dim, dim))
        ik[i,i] = 1
        ans = np.dot(np.dot(z, ik), zi)
        zx.append(ans)
        print('Eigen Value : ' + str(e_vals[i]))
        print(ans)
        anx += e_vals[i].real * zx[i]
    print('Answer')
    print(anx)
```

In [3]:

```
A = np.matrix([2,3,2,1])
A = A.reshape((2, 2))
findspectral(A)
```

```
Eigen Value : (4+0j)
[[ 0.6  0.6]
 [ 0.4  0.4]]
Eigen Value : (-1+0j)
[[ 0.4 -0.6]
 [-0.4  0.6]]
Answer
[[ 2.  3.]
 [ 2.  1.]]
```

In [4]:

```
A = np.matrix([0,6,0,1,0,1,1,1,0])
A = A.reshape((3, 3))
findspectral(A)
```

```
Eigen Value : (-2+0j)
[[ 0.6 -2.4  1.2]
 [-0.2  0.8 -0.4]
 [-0.2  0.8 -0.4]]
Eigen Value : (3+0j)
[[ 0.4   0.9   0.3 ]
 [ 0.2   0.45  0.15]
 [ 0.2   0.45  0.15]]
Eigen Value : (-1+0j)
[[ -2.77555756e-17   1.50000000e+00  -1.50000000e+00]
 [  4.62592927e-18  -2.50000000e-01   2.50000000e-01]
 [  2.31296463e-17  -1.25000000e+00   1.25000000e+00]]
Answer
[[  2.77555756e-17   6.00000000e+00  -2.22044605e-16]
 [  1.00000000e+00  -8.32667268e-16   1.00000000e+00]
 [  1.00000000e+00   1.00000000e+00   2.22044605e-16]]
```

In [5]:

```
A = np.matrix([1,2,1,6,-1,0,-1,-2,-1])
A = A.reshape((3, 3))
findspectral(A)
```

```
Eigen Value : (-4+0j)
[[ 0.32142857 -0.28571429 -0.10714286]
 [-0.64285714  0.57142857  0.21428571]
 [-0.32142857  0.28571429  0.10714286]]
Eigen Value : (3+0j)
[[ 0.76190476  0.28571429  0.19047619]
 [ 1.14285714  0.42857143  0.28571429]
 [-0.76190476 -0.28571429 -0.19047619]]
Eigen Value : (1.71642330619e-16+0j)
[[ -8.33333333e-02  -1.64346022e-32  -8.33333333e-02]
 [ -5.00000000e-01  -9.86076132e-32  -5.00000000e-01]
 [  1.08333333e+00   2.13649828e-31   1.08333333e+00]]
Answer
[[  1.00000000e+00   2.00000000e+00   1.00000000e+00]
 [  6.00000000e+00  -1.00000000e+00   3.58268045e-16]
 [ -1.00000000e+00  -2.00000000e+00  -1.00000000e+00]]
```

In [ ]:

```

```